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NEW METHOD OF HYDROGRAPHIC SURVEYING.

BY H. A. NORRIS.

Description.—Two observers, A and B, are placed at points properly selected in a harbor to be surveyed. Each observer has a theodolite, (or instrument for measuring horizontal angles,) a chronometer, flag-staff, set of signal-flags, and a man to make signals, or watch for them with a spy-glass, as may be required.

The sounding-boat C, is furnished with a chronometer, a flag-staff, set of signal-flags, sounding-lead, and is manned with a proper crew, and commanded by the chief of the party or an assistant.

We will suppose it desirable to take observations and soundings every minute. One of the stations, A for example, is selected to make the signals by *its* chronometer, and *the other chronometers* are compared with it. Ten seconds before the commencement of a minute, A's man raises a red flag, calling out, "up." "Up," repeats B's man, who is watching for the signal with spy-glass in hand. Both A and B, having thus a simultaneous warning, direct the telescopes of their instruments

upon the boat's flag, and by means of the tangent screws, follow the boat's motion until A's flag falls at the exact commencement of the minute, his man calling out "down," as does B's man, who is watching for the fall of the flag; at the same moment the sounding is made in the boat C by the chronometer. From the moment their men call out "down," A and B cease to move their instruments, each reads the angle of his instrument, and writes it down opposite the hour and minute. C, in the boat, writes down the depth of water opposite the hour and minute. Their notes are as follows.

A's Notes.			*B's Notes.*			*C's Notes.*		
Hour.	Min.	Angle.	Hour.	Min.	Angle.	Hour.	Min.	Depth.
VIII	5	221° 02′	VIII	5	310° 30′	VIII	5	19½ ft
	6	220 45		6	310 01		6	18
	7	219 56		7	309 32		7	19
	8	219 09		8	308 56		8	20½
	9	218 41		9	308 07		9	21¼
	10	217 36		10	307 14		10	21
	11	216 49		11	306 23		11	20¾
	12	216 02		12	304 58		12	19

19
18½
21
21
21
20½
20

The same process is repeated every minute. The boat proceeds over the locality to be surveyed, the soundings are regularly made, and the angles as regularly measured by the instruments on shore. It is always desirable, when it can be done, to sound also at the half-minute between the observations, and *these* soundings may be written between the minute ones, and a little to the right hand, as in C's notes.

Recapitulation.—This method is simply one of triangulation; the observations being taken from the extremities of a base line to a moving flag, simultaneously and at equal intervals of time: one chronometer governing both observations on shore, and another, set to the first, governing the soundings in the boat.

Comparison.—There is a method, described in treatises upon surveying, where two observers measure angles to the flag of the sounding-boat; but the boat is anchored for the time, and the angles are taken by *signal from the boat;* and the signal must be recorded, in order to identify the angles with the soundings to which they belong. To this method there are several very serious objections:—1st. The boat cannot be anchored, the signal made, and the boat put in motion again in

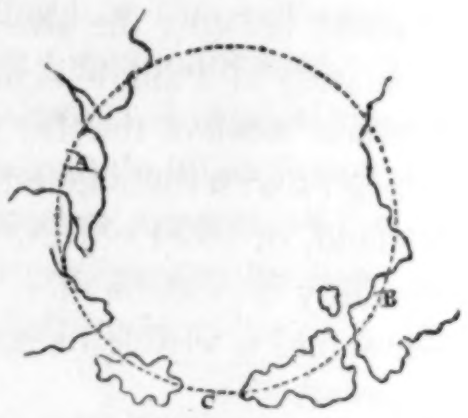
less than from 10 to 15 minutes.—2d. There is great difficulty in clearly distinguishing signals composed of *different* flags, at distances frequently occurring.—3d. Where the signal consists in merely hoisting the *same flag* when the angles are to be taken, the missing of a single signal may confuse and render worthless the whole work of the day; for in that case nothing can identify the angles with their soundings; and the intervention of a vessel, an island, or other object, may produce this result.—4th. It is frequently impossible for those in the boat, to judge whether their signal is visible or not from one or both of the stations on shore.

But in the new method, the signal to take the angles is made at one station on shore, and is always visible at the other, for there is no variation in the distance or direction. Each observer having a chronometer, the *time* when any angle is taken, distinguishes that angle from all others, beyond the possibility of a mistake. And when by any cause, an angle or several are missed, those only are lost; every one taken before or after is identified by the minute when taken.

It often happens that the boat's flag-staff, which may be from 20 to 30 feet high, can be seen by the observers when the boat itself is hid by bushes or other intervening objects. The old methods could not be used here; for those in the boat, not being able to see the stations, cannot judge whether their own signals will be *distinguished* or even seen by the observers. I have been in the boat, unable for hours to see either station; but I proceeded as usual, sounding at the regular intervals; and have had the satisfaction, on returning to the stations, to find the work perfect.

Selection of Stations.—This part of the surveyor's duty requires great care; and, if well performed, contributes largely to the facility and accuracy of a survey. The stations should be from one to two miles distant from each other; or if the nature of the ground does not allow you to choose these distances, they may be as near as half a mile, or as far as four miles from each other. This last distance is about as far as ordinary signal-flags can be distinctly seen. Indeed it is too great, unless necessity imposes it. For, if stations are so far apart, the boat must fre-

quently be at a still greater distance from one or the other of them; and then any thickness in the atmosphere may render the boat invisible to the observers, and of course stop the work.



To survey any particular portions of a harbor, the stations should be chosen so that the lines drawn from them should intersect at the boat, under an angle of 90°, or as near as may be to it. In the figure annexed, the points A and B, or any two others diametrically opposite upon the dotted circumference, would serve as stations to survey the bar C, and much of the ground inside the harbor, giving angles at the boat near 90°. A smaller angle, 60° or even 30° may be used; but the nearer the angles approach 90°, the easier and more exactly the work can be put upon paper; and any errors that may arise from not taking the angles simultaneously, will be thereby rendered insignificant.

When, in the progress of a survey, the stations cease to give angles sufficiently large at the boat, one or both of them must be changed. All the points used as stations, must, of course, be accurately marked, and triangulated in the usual manner.

Service of the Stations.—Each observer should have, in addition to what was enumerated at the commencement, a two-oared boat, to carry him to and from his station; a tent or awning, to shelter his instruments from the sun and wind; and a small directing-flag to be placed behind his instrument in exact line with the other station. This flag is to enable the *other observer* to set his instrument accurately on the line at the commencement of a day's work, and to rectify it, if during the work, it becomes deranged. On arriving at his station to commence work, the observer plumbs and levels his instrument over the point selected, plants his directing-flag in exact line, and directs the telescope of the instrument upon the directing-flag of the other station. Having raised his tent or awning, and made all necessary preparation, he makes signal that he is ready to commence. When the other observer answers it, it is hauled down, as is the answering signal at the other station immediately afterwards.

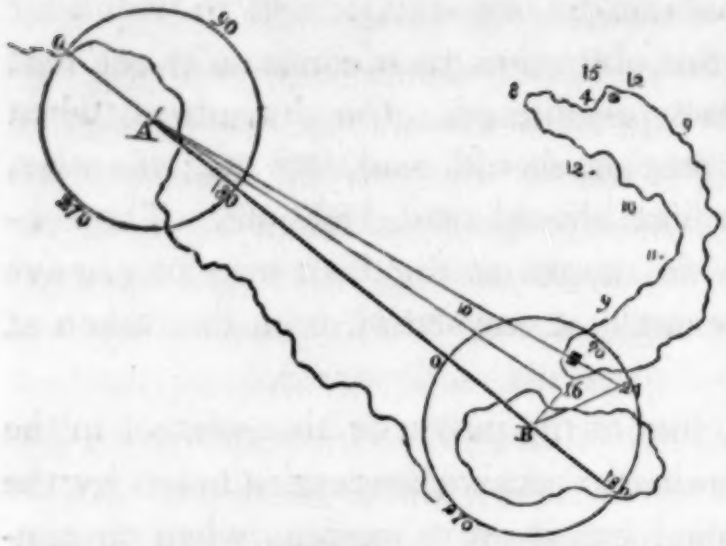
The *minute*-signal will be made the next even 5 minutes by the chronometer, after which the work will regularly proceed. The most careful and prompt among the men must be selected to make the minute-signals at the one station, and to watch for them at the other; and the observers must continually see that those duties are accurately performed. *One* intrument, when directed upon the other station, should read 00° 00′; *the other*, when directed upon the first, should read 180° 00′. The convenience of this is, that the angle at the boat may be always found by subtracting the angle at one station from that taken at the other.

Keeping Notes.—The chief of the party, or his assistant in the boat, has his note-book ruled to receive the angles taken by the observers, which are copied into it every evening when circumstances will permit. The following is a specimen of the complete notes.

LEFT-HAND PAGE.					RIGHT-HAND PAGE.
Obs'ns at A.	Obs'ns at B.	Time.	Depth.		Y
136° 30′	66° 56′	7 15	12 ft.		10
135 39	61 05	7 14	15		12
138 42	60 12	7 13	4		10
136 29	48 49	7 12	8		10
146 50	59 54	7 11	12		15
150 35	74 19	7 10	10		15
155 30	87 20	7 9	11		25
161 55	82 03	7 8	9		18
169 56	58 40	7 7	10		25
174 55	98 20	7 6	16	25	20
170 01	118 15	7 5	21	30 ft.	10 ft.
					X
Monday, April 22, 1838.					TOPOGRAPHICAL NOTES.

It is convenient, when shores are to be surveyed as well as the bottom, to commence the notes at the bottom of the page, as is practised in compass-surveying. In the specimen annexed, the line X Y represents the course of the boat, whether that course is crooked or straight; and the figures on the right and left of X Y express the distances from the boat to the right and left hand shores, at the respective times recorded in the column marked *Time*. Those distances can be estimated accurately enough by the eye, when they are not greater than a boat's

length or two. To delineate a shore with great exactness, it may be well to check the boat's motion in whole or in part, at the moment of observation, and for a few seconds before.



Plotting.—Annexed is an example of plotting, from the notes above. The points A and B being determined by triangulation, two circular protractors are laid down upon them, so that their readings may correspond with those of the theodolites at the stations. The angles are then laid off in pairs, and the positions of the boat found by the intersection of lines, as indicated in the figure. Having ascertained points near the shores, the latter can readily be drawn by measuring off the corresponding distances found in the topographical notes.

Currents.—These may be ascertained with great accuracy, by taking observations from two stations to a floating body, so constructed as to take hold upon the upper or under current, as the one or the other is to be examined. If, in addition to the horizontal angles, those of elevation were measured, the same process would ascertain the path of bodies moving in the atmosphere, such as balloons or meteors.

Mountainous or uneven ground can be surveyed with great rapidity, by the means just mentioned. The horizontal angles to a flag *carried* over the ground would give points in horizontal projection, and the angles of elevation or depression would determine every rise or fall of the ground. With good instruments, the work would be done very accurately.

Of using more than two Theodolites.—For the purpose of simplicity in explanation, I have supposed only two instruments to be used. Three or four might with great advantage be used in the same manner: in that case, if one base line did not give proper angles at the boat, another would; and if one observer

should miss one or more angles, there would still remain *data* enough to establish every point. The principles governing the choice of stations may readily be applied to the case where there are three or more of them.

Capabilities of this method.—It must be obvious to those who have carefully read what precedes, that any locality can be surveyed *as rapidly as a boat can be rowed over it.* No buoys are required, nor is any previous preparation necessary. In the survey of the débouches of the Mississippi in 1838, I have frequently anchored my vessel in a new locality in the forenoon, and before night surveyed more than a square mile of the vicinity; leaving, however, the triangulation of the points used as stations to be done afterwards. Any given quantity of ground can be surveyed by this method, in from one-fourth to one-fifteenth of the time necessary to do it by the usual methods. Vessels of war visiting unknown harbors might make valuable surveys in less time than is usually spent in procuring wood and water.

Accuracy of this method.—It has been frequently put to tests that appeared conclusive to all who saw the results, among whom were several scientific officers of the U. S. army. For example: by placing stakes in different parts of a harbor, and visiting them at different periods of the survey, always making a memorandum of each visit opposite the time when made, and then comparing the angles measured by the observers at those different times; or rowing a boat through a creek only wide enough to allow the boat to pass, and repeating the operation in the same creek, the boat proceeding with different velocities, and with the current, against it, &c. and then examining if the drawings made from these several surveys were alike; or by tracing the same island or shore, at different times, by rowing the boat along its margin, and comparing the drawings as before.

This mode of hydrographic surveying was explained by the inventor to a company of scientific gentlemen, at the Mechanics' Institute, City Hall, a few evenings since, and met with unqualified praise for its accuracy and rapidity. ED.

For the American Repertory.

GEOLOGY OF THE STATE OF NEW-YORK.

Report of the New-York State Geological Survey for 1839. *Assembly Document No.* 50. pp. 484. Jan. 1840.

The geological survey of the Empire State, the offspring of the most enlightened policy and liberal views, rapidly approaches its consummation, on the 1st of July next. The present report is characterized by the same zeal, energy, and signal ability, which have distinguished those of former years; and the most unscientific cannot read it, without being satisfied of the wisdom of that policy which directed this magnificent undertaking.

1. The first report is that of Dr. J. E. De Kay, of the Zoölogical Department. The first part consists of a catalogue of the animals belonging to the state of New-York, as far as they have been figured and described. These consist of—

Mammalia,	13 Genera, 12 Species.	*Mollusca*,	35 Genera, 30 Species.
Birds,	155 Genera, 144 Species.	*Annulosa*,	4 Genera.
Reptiles,	8 Genera, 17 Species.	*Crustacea*,	6 Genera, 4 Species.
Fishes,	58 Genera, 37 Species.	*Insects*,	60 Genera, 111 Species.
		Zoöphytes,	4 Genera.

Of the Mammalia, the first order, Quadrûmana, is entirely wanting in the United States: and of the Carnivora, although there exist more than 150 species in various parts of the globe, 6 only have as yet been described as residents of this state. Of the order Marsupiata, 50 species are known, chiefly residents of New Holland: of these, but one, Didelphis Virginiana, has been noticed in the United States. Of the order Rodentia, family Musidæ, about 21 species have been found in this state; but there doubtless remain many others not yet described. Total species of Mammalia in this state, 71.

Of Birds, about 490 species have been noticed in all North America; and of these, more than 300 have been observed

already within the limits of this state. We are glad to see that all these are figured.

Of Reptiles, 37 species have been observed within the limits of the state; *232 species of Fishes have also been noticed, and 234 of molluscous animals. Of the order Articulata, including the Annelides, Crustacea, Arachnides, and Insecta, 68 species have been found; and of Radiary animals, 16 species.

It will be seen that Dr. De Kay has undertaken a most arduous work: we trust that no short-sighted policy will restrict him within less limits than are required for properly accomplishing his herculean labors. This department of the survey could not be in better hands.

2. The next report is that of Dr. L. C. Beck, of the Mineralogical Department. In his first report, for the year 1836, Dr. B. gave an account of the most important mines of iron, lead, and other metallic minerals within the state. In the report for 1837, he described our most important mineral springs, and gave an elaborate analysis of their waters. In the year 1838, he examined and analyzed many of our other mineral productions, and made very extensive collections for the state cabinet, which are embraced in the report for that year. The last year has been devoted chiefly to the same object; during which time, in connection with Dr. Horton, he has obtained upwards of 3000 specimens for the use of the state. For a detailed account of Dr. Beck's valuable labors, we must refer our readers to his report.

3. We next have the report of Dr. John Torrey, on the Botanical Department of the survey. Dr. T. estimates the whole number of species of plants, indigenous and naturalized in the state, including the lower orders of the Cryptogamia, to exceed 2400. The Phenogamous or flowering plants, however, have chiefly occupied his attention; and of these, 1350 have been found within the limits of the state; and of ferns and plants allied to them, 53 species. The Mosses have not received

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*The late Dr. S. L. Mitchill describes but 147 species and 19 varieties of New-York fishes, making 166 in all. Of these, 60 were figured in the 1st volume of the Transactions of the Literary and Philosophical Society of New-York.

much attention, although many specimens of them have been preserved, and the number of them belonging to the state is estimated at 150. Of Hepaticæ and Characeæ we, have 30 species. The Lichens are more than 150; and the number of Fungi in the state is at least 300. Of the flowering plants already discovered in the state, 277 are trees or shrubs, 150 are reported to possess medicinal properties, and 140 are plants which have been introduced from foreign countries, and are now naturalized in our soil. Of proper Grasses, our Flora contains 116 species, 24 of which are of foreign origin. In the nearly allied tribe of the Sedges there are 140 species, more than half of which belong to the genus Larex.

Dr. Torrey presents us with a catalogue of all the flowering plants and ferns hitherto detected in the state, arranged according to the natural method. Only such synonyms are added as are necessary for distinguishing the species with certainty. The locality, general or special, of each plant is likewise given, together with the time of flowering, popular names, and occasionally some remarks. We aré happy to learn that Dr. T. proposes to give us, in his final report, full descriptions of all these plants, in as popular language as the subject will admit of, with particular attention to their economical and medicinal uses. Dr. T. urgently requests botanists in different parts of the state, to furnish him local catalogues of plants, with their time of flowering, and time when the seed ripens; also, the names of such species as are not included in his catalogue, and dried specimens, or drawings with numbers annexed, for examination. Specimens and descriptions of medicinal plants are particularly desired, with an account of their virtues and popular use. Also, information respecting the various kinds of timber trees; the quantity, quality and uses of each species; notices of weeds and other injurious plants, with the best modes of eradicating them; and, indeed, any interesting facts relating to the economical or scientific botany of the state, will be thankfully received. We are gratified to find that Dr. Torrey drops his exclamation points after the names of authorities; an affectation which ought to be expunged from his other botanical works.

4. The next report in order is that of T. A. Conrad, on the Palæontological Department. There is a peculiar interest connected with the subject of organic fossil remains, and we should have been pleased to find the report on this department assuming a *popular* as well as scientific cast, for we see no incompatibility in blending them togĕther. Hitherto some fault has been found with Mr. Conrad, for the exclusively technical character of his reports: we trust that his final report will not be obnoxious to such criticism. We are aware that Mr. C.'s department is a difficult one, and one but little explored hitherto; much indulgence should, therefore, be extended to him; still, he should not forget that he is laboring for the *pĕople*, for whose gratification and instruction it is his duty to aim. We object not to technical descriptions of shells and other organic remains; this is necessary; but a Buckland and a Mantell have shown that an interest and a fascination may be thrown over these subjects, equal, if not superior, to what we experience in the perusal of a novel or book of travels. We have a high opinion of the qualifications of Mr. Conrad for the department assigned him; and we have no doubt he will eventually present such a work as will be entirely satisfactory both to the general and scientific reader. We shall reserve our remarks on Mr. C.'s views to a future number of this journal.

5. The next report in order of publication is that of W. W. Mather, containing an account of the economical geology of Sullivan, Ulster, Delaware, Greene, and Schoharie counties. He describes the discovery of fine building-stones and marbles, favorably situated for exploration and transportation; also, of extensive strata of flagging stones, which were supposed to be confined to a comparatively small area; and of immense deposits of water limestone and peat; the discovery of mineral springs, and the examination of supposed mines, the proprietors of which have been induced to suspend operations, there not being sufficient indications of mineral wealth to warrant further exploration. In this way alone, we believe that an amount of money ten times exceeding that of the cost of the annual survey, will be saved to the citizens of this state, for a long series of years to come. The accomplishing of this object alone, should be a

sufficient inducement for every state to enter upon similar surveys.

The first subject treated of in the report, is that of *Peat*. The four counties assigned to his survey are computed to contain about 2,500,000 cords. It is now ascertained that peat furnishes one of the most valuable manures; and Mr. Mather recommends, as the best mode of preparing it, to make it into compost heaps, with some lime and stable manure, or to have cattle and hogs yarded on it, where it is exposed to the weather and frost. It has been proved—1. That peat is equal in value to oak wood, bulk for bulk.—2. That peat-lands are far more productive than up-lands.—3. That peat manure is more valuable than stable manure.

Mr. M. states that a *coal mine* has been opened in Sullivan county, in the vicinity of Red Bridge, near the Delaware and Hudson Canal, consisting of a bed of black carbonaceous shale, some five feet thick, containing vegetable impressions similar to those of Carbondale. A seam of anthracite, from 6 to 9 inches thick, is said to occur in the shalé, which was not seen, however, as the mine was filled with water. Mr. M. thinks there are no seams of workable coal in this region; and yet, that if there should any be found in the state, it will probably be in this vicinity.

The stone so extensively employed for flagging in our cities, is a blueish gray, slaty sandstone, which forms a stratum about two feet in thickness, and can be split out in slabs of from ten to a hundred square feet, and from one to four inches thick. The rock is traversed by joints that divide the slabs about perpendicular to their layers, and as smooth as if cut by a saw. This stratum of flagstone is about 1000 feet *above* the Helderbergh limestone series. The aggregate amount quarried in Sullivan, Ulster, Greene, and Albany counties, is computed to amount to 3,500,000 feet per annum.

Hydraulic cement has become a very important article in the commerce of our state. The beds of limestone that yield this article, are extensively worked in the vicinity of Kingston, Rosendale, Lawrenceville, and High Falls. More than sixty kilns are in constant operation for the manufacture of cement,

each yielding about forty barrels per day, and the total quantity exceeds 600,000 barrels annually. The Croton Water Works, and the various government works, consume large quantities of this cement; and its uses for various hydraulic works and for cisterns, tight cellars, aqueducts, &c. cause a continually increasing consumption. It is also shipped to all the Atlantic ports, and to the West Indies. The kilns are built something in the form of a high furnace, except the hearth, which has a sloping sole of 40° to 45° from the back of the kiln to the floor of the drawing arch at the base. These kilns are kept in constant operation several months, and are charged like a high furnace. The dust anthracite and broken cement, each are charged, as usual in perpetual kilns, twice in 24 hours, each charge being introduced in successive layers at the top of the kiln, after a quantity of cement has been hauled out from the sole of the kiln into the shed next the drawing arch. About a ton of dust anthracite is used daily in a kiln that burns forty barrels per diem. The kilns are usually built double or triple; that is, two, or three, or even more, are built in one stack; one set of men being sufficient to attend several kilns. Some have roofs over them, others have not, but all have sheds over the drawing arches, in consequence of the necessity of protecting the cement from the weather. These kilns, together with the mills for grinding the cement, are situated directly on the banks of the Delaware and Hudson Canal. The cement business of Ulster county alone, gives employment to nearly 1000 men, including quarrymen, burners, teamsters, millers, packers, coopers, and those engaged in transporting the article to New-York; and indirectly it gives employment and profit to many others.

In relation to selecting proper materials for erecting durable edifices, Mr. Mather very justly remarks:—"It is surprising to see how little attention is paid to the selection of materials for construction. Judging from what has come under my observation, the general impression must be, that *any solid stone may with equal propriety be put into the walls of buildings.* It is not so; and in our public works and expensive buildings, it is of great importance to select materials that will stand time unchanged.

Some granites, limestones, sandstones, marbles, and other rocks, will stand the vicissitudes of the seasons for ages, without any perceptible change; others, nearly similar in appearance, and belonging to the same kinds of rocks, will crumble to sand or powder in a few years. An experienced eye is necessary to judge whether particular kinds of rock ought to be employed for structures that are intended to be permanent."

The best commentary we can offer on these remarks is the fact that the trustees of Trinity Church, of this city, have selected for the erection of their new church-edifice, the soft, friable sandstone of New Jersey, which in all probability will crumble to powder in less than one hundred years; and this, too, notwithstanding the inexhaustible beds of granite upon Staten Island, which, we understand, have been gratuitously offered for the working. A frailer material than this sandstone can hardly be found any where; and the only reason offered for its selection is, that its sombre hue is well adapted for the solemnity of such a structure. If this be a good reason, we would suggest as an improvement, that the church be painted black. We would respectfully ask the trustees of this wealthy corporation, if it be not indeed too late, to call for the advice of our state geologists before they proceed any farther; for geologists *at a distance* know but little as to the real nature of the rock in question.

Mr. Mather, in describing the Shawangunk grit, a rock which lines the borders of the Delaware and Hudson Canal, remarks: "These fine grits would make a beautiful and durable building material, which is as easily dressed as the common granites. Localities were seen within less than two miles of the canal, where blocks could be procured 3 to 5 feet thick, and 5 to 20 feet in their other dimensions, without a seam, and on which the weather has produced no perceptible effect during the ages through which they have been exposed. Such as this the engineer may use, without fear of hazarding his reputation; and his employer may feel certain that the structures built of it will not crumble down by the ordinary action of the weather in a few years, like some of our public works and private dwellings." The color of this rock is generally white, or of a light gray,

although some beds of it are red. It is somewhat employed for millstones, and for making glass. Its durability ought to bring it into extensive use as a building material.

The remaining Reports are those of Dr. Emmons, Messrs. Hall, Vanuxem, and their assistants. As these contain much interesting and important matter, we shall reserve our notice of them till the next number of this journal. L.

MECHANICS' VADE MECUM.

No. I.

Under this title, we intend to give our readers a series of papers, which will prove useful to every class of artisans: one or more tables will be given with each number, intended to assist the mechanic in making estimates of strength, cost, &c. of materials.

We will briefly state our reasons for the proposed series. It is not unusual (in this city, at any rate) to build ware-houses so heavily timbered, that nearly the entire strength of the walls is required to support the weight of wood-work, or (which is equally fallacious) the walls are sometimes so heavy that a large portion of the material is unnecessary, and walls of a less thickness would support all the weight the floors are capable of receiving: in either case, there is a useless weight of material, which can easily be avoided by reference to well arranged tables of strength of materials. Such tables will greatly assist the builder in making estimates of cost.

To the machinist they will be of still greater consequence. Suppose a case—and such cases are almost as numerous as steam-boats:—An engine is ordered for an Atlantic steamer, of a given number of horse power. The builder is supposed to know the precise weight and strength proper for each part; and therefore, so long as the requisite strength and power result, no further questions are asked, but all is taken for granted as correct: this might and has occurred in engines, where the crank or some other part has weighed five tons more than at all necessary for useful purposes; and as the freight of five tons across the Atlantic, at £5 per ton, would be $111, and as

fourteen trips are made per year, a loss of $1554 is made each year to the owners. Suppose such a vessel to remain in use twenty years, the total loss from such a miscalculation would be $31,080; in addition to extra fuel necessary to overcome the friction occasioned by this excess of metal. Where engines are built by contract, the useless consumption of material causes the contract to prove unprofitable, in addition to the abuse of confidence. (See our last number, p. 241, headed "Machine Drawing and its Advantages.")

Tables of Weight, &c. of Building Materials.

NAMES OF BODIES.	Weight of a cubic foot in pounds and ounces.		Spec. gravity com. with water as 1000	NAMES OF BODIES.	Weight of a cubic foot in pounds and ounces.		Specific gravity compared with water as 1000.
Woods.	lbs.	oz.		Logwood	57	1	.913
Poplar	23	15	.383	Oak (English)	60	10	.970
Elm	34	12	.556	Ebony	83	3	1.331
Mahogany, (Hond.)	35	0	.560	Lignum Vitæ	83	5	1.333
Pitch Pine	35	0	.560	*Stones and Earths.*			
Willow	36	9	.585	Brick	125	0	2.000
Cedar	37	4	.596	Paving Stone	151	0	2.416
Pear Tree	41	5	.661	Common Stone	157	8	2.520
Walnut	41	15	.671	Red Granite	165	14	2.654
Forest Fir	43	6	.694	Free Stone	166	8	2.664
Elder	43	7	.695	Slate	167	0	2.672
Beech	43	8	.696	Grey Granite	170	8	2.728
Cherry Tree	44	11	.715	Marble	171	6	2.742
Teak	46	9	.745	Basalt	179	0	2.864
Maple	46	14	.750	Limestone	198	11	3.179
Apple Tree	49	9	.793	*Metals.*			
Alder	50	0	.800	Cast Iron	450	7	7.207
Mahogany (Spanish)	53	4	.852	Bar "	486	12	7.788
Oak (American)	54	8	.872	Cast Copper	549	4	8.788
Boxwood (French)	57	0	.912	Cast Lead	709	8	11.352

Weight of Lead per superficial foot, for the several thicknesses from $\frac{1}{16}$th of an inch to 1 inch.

Thickness. inches.	Weight. lbs	Thickness. inches	Weight. lbs	Thickness. inches	Weight. lbs	Thickness inches	Weight. lbs
$\frac{1}{16}$	$3\frac{3}{4}$	$\frac{1}{8}$	$7\frac{1}{2}$	$\frac{1}{4}$	$14\frac{3}{4}$	$\frac{3}{4}$	$44\frac{1}{4}$
$\frac{1}{12}$	5	$\frac{1}{6}$	10	$\frac{1}{3}$	$19\frac{3}{4}$	1	59
$\frac{1}{10}$	6	$\frac{1}{5}$	12	$\frac{1}{2}$	$29\frac{1}{2}$		

Cast sheet-lead, 7 lbs. weight to the square foot, is used for roofs, gutters, terraces, or flats. Milled lead, under 7 lbs. weight, is used for ridges, flashings, &c.

For the American Repertory.

THE ART OF BUILDING.

BY JAMES FROST.

No. V.

Having in former papers shown, that by the aid of modern science, durable, incombustible and temperate buildings, may be as easily constructed as the present perishable, combustible and intemperate; that as much or more space is attainable therein, and by the use of as little material and at as little cost, if a fair allowance be made, as it justly ought, for the saving effected in insurance alone; and as such buildings are in so many respects vastly preferable to the present, it follows they are also much the cheapest.

In estimating the real value of these improvements, we ought also to make a fair allowance for the great public benefit and value these buildings may occasionally be of to the owners, occupiers, and insurers of the combustible buildings in their immediate neighborhood; from the certain and effectual barrier they will ever interpose to the spread of fire, and for which purpose they are so frequently and intensely needed; and on which calamitous occasions the present miscalled "fire-proofs" are found not only ineffectual in protecting their neighbors from destruction, but are frequently involved in the common ruin. In fact, at the great fire in New-York, a host of such *fire-proofs* were destroyed, with just as much rapidity as the other buildings less pompously named; and since then, it is well known that several "doubly improved fire-proofs" have been penetrated and consumed by fires originating in other buildings.

Another powerful inducement, then, for these improvements, is added to the numerous ones already presented to the prudent man, in the costless and patriotic opportunity afforded of being thus alike beneficial to his neighbor and to his country in the time of need, only by having secured his own property from destruction at the cheapest possible rate.

Minor inducements of no trifling value will also be obtained, in the perfect security from vermin, and from the teazing and

nauseous annoyance of noxious insects, frequently as securely as formidably intrenched in wooden buildings.

Another, and by no means a minor inducement, will be found in the great saving of expense for fuel surely accompanying a temperate construction of buildings, in which the ingress of external cold and the egress of internal heat being nearly prevented, the use of stoves will be no longer needed, as essential to comfort. Hence, an invaluable inducement is held out, in the removal of those cruel enemies to blooming complexions and foes to robust health, and the insidious, fell destroyers of life itself.

As enough has been stated to show that incombustible buildings, of every kind, are now rendered of easy attainment, as the great difficulties hitherto attending such are overcome, and the enormous expenses hitherto attending them is now so reduced as to have brought them within the means of all classes of builders; these improvements, involving matters of such vast importance, will doubtless in time receive full attention. What present attention these or any other very important improvements in art will receive, is not very pleasing to anticipate by comparison with the attention that improvements of the greatest consequence have hitherto usually received on their first promulgation. To name Oliver Evans, or Fulton, would be to recall neglect or insult, or both, as the probable first return to be expected in such cases.

Many of the public works of New-York are at present in a state capable of immense improvement. Whoever has seen the remains of ancient buildings in England, and is possessed of the requisite information for comparing their structure with those of modern date, cannot fail to have been surprised at the singular economy of the ancient works, when thus duly compared with those by modern artists.

In various parts, abounding with the remains of public buildings of magnitude, where wharves, bridges, churches, palaces, castles and fortifications, are formed almost wholly of small, round, flint pebbles, smaller than the pebble paving in New-York, without any large stone interbonded, except at the external angles of walls; and these extensive works being mostly situ-

ated on the upper chalk formation, the lime there produced is considered the weakest of any now manufactured. Yet many of these buildings, from five to nineteen centuries old, promise to endure for ages; for of their great strength, experimental proof enough is afforded in the removal of small portions for modern improvements, to effect which, gunpowder is often found to be the only effectual agent.

As the ancients could thus compose such stupendous works with mere pebbles and weak lime, setting slowly and indurating only in centuries, what works may and ought not the moderns to execute, furnished as they are with stone of all sizes, with such an abundance of cheap yet invaluable cements, (wholly unknown to the ancients) of such excellent and various qualities as to be adapted to every situation and object; from those slowly setting in weeks or days, to those setting in hours or minutes—from those hardening only in years or months, to those hardening as much as ever needed in buildings within a few hours or even minutes; and all these effects being as cheaply and readily produced in air, within thick walls or under water? Modern artists, who can thus be furnished with such ample powers, till lately unexpected, (and still inconceivable to many) and supplied as they now are, at will, with iron of every form, quality, and quantity—with steam-engines of any power;—surely then, instead of merely rivaling the ancients in economy, (who had no knowledge of these advantages) they ought on all occasions to excel them immeasurably.

Yet if we credit Alderman Clark's description of the piers and wharves of New-York, as periodically decaying every sixteen years, what a pitiful figure do the modern artists assume! for with the same stone, and with a few other materials abundantly found—and what is more singular, at about the same expense per cubic yard—these structures might be made capable of almost endless duration.

These piers and wharves are at present miserably formed of loose stones placed within frames of rough logs, which the worms and elements are sure soon to destroy; and the only improvement hitherto attempted, consists of an additional external timber-casing, which merely gives an improved

appearance at additional cost, without any corresponding increase of durability, being equally expensive with those so superior as to be unworthy of being put in comparison.

The mean dimensions of the piers in use, and their want of proper magnitude, render them totally unfit for the proper and convenient transaction of business thereon; and their general unfitness and incapacity for the support of large warehouses, make them not only unworthy their situation, but a disgrace to the city and to the age: and they are thus the useless and endless cause of incalculable loss to the mercantile community, by preventing the erection of incombustible water-side warehouses, so long demanded and needed, for the ready protection and cheap storage of the immense stock of merchandize, always in a state of transit through New-York; and which is now exposed to injury from all weathers, to pilferers, to rain, snow, or mud—transported at a great expense to distant stores or cellars totally unfit or inadequate for its reception, and at no remote time again transported and exposed to a repetition of the same unnecessary delays, injuries, and heavy expenses.

Now all these heavy losses are useless and abominable taxes on the merchants of New-York, from which they can by no possibility escape while transacting business in this port, but by the erection of proper piers, suitable for and supporting substantial and incombustible warehouses, furnished with labor-saving machinery. They would thus be placed on a level with the merchants of other civilized places, and their property protected from that conflagration to which it is now perpetually exposed.

That such warehouses would be immediately built, is undoubted, because a more safe and ample return for capital may be derived from the outlay, than from any other mode of investment; and therefore, the only possible obstruction to these useful works arises from the wretched construction, dimensions and state of these contemptible piers.

But our wonder will still increase, on further inquiry: the space for piers in New-York being absolutely unlimited, and the necessary materials exhaustless, and not only valueless but an incumbrance to the proprietors of other parts of the island;

and their removal would serve the double purpose of forming substantial and enduring piers in New-York, and of effecting thereby a public improvement much needed in another part of the island, which improvement would thus be of little cost, because it is principally obstructed by the very materials required for the piers.

The proper formation of these piers and wharves in the economical manner referred to, consists in the proper selection, preparation, and use of such hydraulic materials, as being mixed with water, sand, pebbles, and rough stone, will readily set under water within a few hours, and within a few days assume, and forever retain, the consistency of a natural rock, of any required form or dimension. The materials, in small quantities at a time, as mixed, are to be placed within a temporary wooden frame, in regulated quantities, to form a uniform solid mass, of the exact shape and magnitude of the frame provided; which frame, when the work is raised to low-water mark is removed, and the face of the pier formed with rough ashlar, and filled in with the cemented rubble compound to its intended general level, in which any required aperture may be left for drains, sewers, or cellars, which, with the structure altogether, may thus be formed from the cheapest materials, of uniform fabric, of any required shape, as useful, firm and imperishable as a natural rock.

The level surface thus obtained will constitute a pier of a superior kind, for the more convenient and pleasant transaction of all business than any other, because it will be protected from the weather by a range of incombustible warehouses over head. All goods landed on this pier will be under cover, and with the persons thereon be defended from the inclemencies of the weather, and the landing and re-shipping of goods be accomplished, with that expedition, security, trifling expense, and comfort, as has hitherto been unapproachable. Thus all parties interested or employed thereon will be much benefited, and no one injured; while the port of New-York, affording the improved facilities for business, which its admirable natural situation is capable of receiving from art, will be as satisfactory and creditable to the corporation as honorable to this free state.

UNITED STATES MINT, PHILADELPHIA.

In our remarks on Prof. Cummings's lecture, (No. 3, p. 200) we indulged in a comment on the applicability of the arts of design to the mechanic arts; since which we have had an opportunity of seeing their application most fully and beautifully developed.

The steam-engine now in use at the Mint was designed by Franklin Peale, Esq. chief coiner; and were this the only testimonial of his taste and genius, it would be sufficient to place him high in the catalogue of American engineers.

The engine room is as clean as a parlor, perfectly noiseless, and free from all the usual hissings, leaks, oily smells, and other nuisances; every part of the engine, not excepting the fly-wheel, is turned and polished; the journals supplied with oil by syphon-cups, which are regulated with such nicety that not a drop of oil is to be seen even on the larger bearings.

This engine is more classically arranged than any we have ever seen. The cylinder, pump, &c. are mounted on an entablature, supported by eight columns of the Grecian Doric order. These columns are so arranged as to contain the pipes for ingress and egress of steam and water, and consequently no steam pipes are visible. The steam is used expansively, and can be cut off at any part of the stroke. The passage from the cut-off valve or chest, is connected with the steam chest, which resembles the other, containing what is termed a long *d* valve or slide, which renders the cylinder and its appurtenances perfectly symmetrical. The supports of the pump are in perfect keeping; its plunger acting in place of guide-rods to the piston. The fly-wheel is 16 feet in diameter; and having been turned off in its present seat, runs so true that the eye can detect no variation. The stop-valve of the engine is in the form of an Etruscan vase, placed on the pedestal between the end columns under the cylinder.

The arrangement of the governor we believe to be original with Mr. Peale, and it does him infinite credit. Its peculiarities are, regulating the number of strokes to be made by the engine per minute by an index, and performing all the usual offices in

addition thereto. We are prevented from giving a full account of the governor, from the fact that it would forestall a very minute description which will be given in Mr. Hodge's work on American steam-engines, which will appear in about a month.

The floor of the engine-room is paved with colored tiles, similar to those described by Belzoni in the antique palaces of Carnac. The boiler-room is equally creditable; and the visitor would scarcely know, unless told of it, that he was near an engine stack. The boilers have dead heads; not a rivet visible. The guage-cocks, connections, &c. without a leak; not a drop of water, nor the least appearance of steam is any where to be seen.

The machinery in the coining department is equally beautiful, and its accelerated movement under Mr. Peale's arrangements must prove a great saving to government.

We cannot close this article without recording our candid opinion, that if the machinery at the Mint had no other use than to incite our mechanics to emulate its accuracy and beauty, it would be sufficient excuse on the part of government for the outlay.

For the American Repertory.

LYCEUM OF NATURAL HISTORY.

PROCEEDINGS.

September. Mr. W. C. Redfield informed the Society that fossil fish had been discovered by Dr. Gale in the New-Jersey sandstone at Boonville, and that they were apparently similar to one of the species found in the sandstone of the Connecticut valley. Dr. Gale presented a remarkable growth of the root of a willow, which, while of a size less than that of a common goose-quill, penetrated a knot-hole of a water-log, and after entering, completely filled the bore of the log with its numerous fibres, cutting off all passage of the water. Dr. G. also laid before the meeting a specimen of a new application of printing, by which both pages of a book are printed simultaneously, by arranging the type or stereotype plate on the surfaces of two cylinders.

Mr. Inman presented specimens of a peculiar species [?] or variety of maize produced from kernels taken from the crop of a wild goose. These ears were of the second year's growth, and retained the same peculiarity of form and arrangement as those laid before the Society last year. Dr. Hornbeck presented several species of butterflies, from the island of St. Thomas, West Indies.

The Transactions of the Literary and Historical Society of Quebec, Vol. III, Part 4th, was received from that Society. Mr. John Fry presented "The Natural History of Animalcules," by A. Pritchard. Dr. Torrey presented the first part of his Flora of North America. Specimens of copper ore from Bogota, South America, were received from Mr. Gooding. Mr. Bell presented some curious impressions in limestone, from the neighborhood of Rochester, N. Y. Referred to Dr. Gale, for examination. Loudon's Mag. of Nat. History, and the London and Edinburgh Philosophical Magazine for August, were laid upon the table.

October. Mr. Redfield submitted to the examination of the Society a work, entitled "An attempt to develope the Law of Storms," by Lieut. Col. Reid, of the Royal Engineers. Capt. L. Sloat presented a number of fossil shells from the tertiary formation of Alabama. The Annals of the Horticultural Society of Paris were received from that Society. Dr. Gale, to whom was referred the impressions in limestone from Rochester, reported that the impressions were probably the result of concretion, formed by a chemical action analogous to that by which clay-balls, septaria, &c. are formed. Dr. G. presented specimens of granite in a state of decomposition, from this island, near 24th street: he also announced that he had recently found serpentine *in situ*, upon the island, between 58th and 63d streets, and 10th avenue and the Hudson, where it is found in a state of close intermixture with limestone. Professor Bache presented a number of pamphlets, one of which contained his observations on the New Brunswick tornado of June 19, 1835. Mr. W. C. Redfield briefly stated the difference between his own views and those of Prof. Bache, relative to the direction of the currents of wind in that and similar tornadoes. Dr.

Torrey laid before the Society specimens of apophyllite and azeolitic mineral, supposed to be mesotype, from the railroad cutting, Bergen, N. J. Also, a paper on the genus torreya, from the Annals of Natural History. Mr. W. C. Redfield mentioned that the fossil fish obtained from the sandstone of New Jersey had proved to be identical with the species found in the sandstone of Connecticut; thus proving the formations to be contemporaneous. Dr. Gale stated some interesting facts relative to the diluvial scratches upon the rocks of this island. He had found them coincident in direction with those upon the trap ridges of New Jersey: he observed them from the northern extremity of the island to as far south as 16th street, and upon the highest and the lowest points.

The September number of the Magazine of Natural History, and the London and Edinburgh Philosophical Journal, were laid before the Society. Prof. E. Loomis, Prof. S. St. John, and Prof. John Johnson, were elected corresponding members.

The President exhibited the cone of the male flower of the zamia horrida, raised in a green-house at Fishkill. Mr. J. D'Orfeuille presented a specimen of cerithium tristoma, from St. George's island, West Indies.

November. Dr. Gale announced the occurrence of talc and actynolite on the island, near 60th street. Dr. Torrey presented, in behalf of himself and Dr. Gray, the second part of his Flora of North America: he also read an extract of a letter from Prof. Bailey, of West Point, announcing the discovery, by Dr. Jackson, of vast deposites of fossil infusoria in Maine and Rhode Island. Mr. Halsey presented, in behalf of Mr. E. Doubleday, six volumes of the Entomological Magazine, being a complete set as far as published. Dr. Smith stated, that much controversy had arisen upon the question of spontaneous or equivocal generation; and in connection with the subject, he mentioned, that in the pine lands of Virginia, whenever the pines were cut, and the land left uncultivated, they were invariably succeeded by a growth of oak or hickory; and that, although search had frequently been made, he knew of no instance in which an acorn or nut was found to be attached to the root of the young plant. Dr. Gale exhibited a splendid

crystal of garnet, with replaced edges, 4½ inches in diameter, found on the island, near 57th street and 10th avenue. Dr. G. also stated many interesting facts relative to the boulders on the island. He mentioned he had traced to their origin the boulders of red sandstone, sometimes called jasper rocks, so abundant in the diluvium near the upper part of this city, having found the same rock *in place* beneath the trap near Fort Lee, New Jersey. Mr. L. W. Sloat and Edward Doubleday, Esq. were elected corresponding members, and Mr. J. R. Marshall resident member.

December. Mr. De Rham exhibited a thrush, which has hitherto been confounded with the common one, (turdus solitarius) and which he thinks constitutes a distinct species: he pointed out the distinctive characters of the new species, and announced his intention of laying a description of it before the Lyceum, at some future period. Mr. Cozzens presented specimens of micaceous iron ore, in a coarse sandstone of a peculiar character, from boulders near Bull's Ferry. The same rock occurs in place at Schuyler's copper-mine, Belleville, N. J. The President exhibited the cone of the pinus pinea, a native of the south of Europe, the seeds of which are eaten by the peasantry. The London and Edinburgh Journal of Science, and the Magazine of Natural History for November, were placed before the Society. The Transactions of the Agricultural and Horticultural Society of India, Vols. 4, 5 and 6, were received from that Society.

Dr. Boyd presented the 1st and 2d Reports of the Geological Survey of Virginia; also, a specimen of cats-eye penetrated by asbestos, from the Blue Ridge, Paige county, Virginia. Mr. Benjamin Moore was elected resident member. B.

FRANKLIN INSTITUTE, PHILADELPHIA.

We had an opportunity, a few weeks since, of attending one of the monthly conversational meetings of this society.

The institution is too well known and appreciated to require any comment from us. Its conversational meetings, however,

are peculiarly beneficial, and worthy of imitation by other associations. The members meet for mutual instruction, and each communicates to the others present any new facts connected with the sciences or mechanic arts, which may have transpired since the last meeting: thus each member, in mercantile phraseology, is fully *posted up* to the day; and the opinions and experience of practical men are thus rendered available to all the members. The Mechanics' Institute of this city has organized similar meetings, which are held at the City Hall three evenings in each week. They are indebted for the hint to the Franklin Institute; and had that institution conferred no other benefit than this upon the mechanics of New-York, it would be entitled to their warmest thanks.

REMARKS ON SPECTACLES

BY DR. WALLACE, OCULIST, N. Y.

There are two periods of life at which vision is apt to be influenced by defective adjusting power. At fifteen, the beard begins to grow, the voice becomes rough, a change takes place in the whole system, and in the pampered and luxurious the erectile tissues are apt to become morbidly excited. As the adjusters of the lens belong to the erectile class of membranes, they also occasionally become over-distended, and draw the lens so far forward that the patient cannot discern distant objects without the aid of concave spectacles. Short-sightedness most frequently occurs about the time of puberty, and is for the most part confined to the over-indulged, while it is seldom seen among the followers of a rural occupation. When spectacles are worn at this period of life, the lens becomes fixed in a wrong position, and the exertions of nature to remedy the defect are prevented. A little of the extracts of stramonium or henbane, rubbed upon the brow at bed-time, and washed off in the morning, is a simple and often an effectual cure for short-sightedness.

At forty-five the hair begins to turn grey, the tissues become relaxed, and owing to the want of power of the adjusters to draw forward the lens, it is drawn back by the elasticity of the

membranes behind it, so that the person cannot see near objects distinctly without convex spectacles. At this time, frictions on the brow and temple, with a solution of four grains of strychnine in a gill of alcohol, with a little vinegar, will in many cases make the vision perfect.

Far-sightedness is occasionally observed among the young. In the Edinburgh Medical and Surgical Journal for January last, there is related the case of a boy 9½ years of age, who had been three years at school, and at once became so far-sighted that he could only see near objects distinctly by wearing his father's spectacles; yet he recovered his sight by judicious treatment. It is the opinion of the practitioner, that if the wishes of the patient had been complied with, and he had been allowed to continue the use of his father's spectacles, the *presbyopia* (far-sightedness) would have become a confirmed disease.

The talented editor of the Boston Medical and Surgical Journal makes the following observations:

"It is one of the gross mistakes of approaching age, that people at such times imagine a necessity for spectacles, when, in fact, in eighty cases out of a hundred, the eye-sight is positively injured by them. If we tamper with our eyes, and interpose glasses between the cornea and the object, a remodification and reädjustment of the parts within necessarily follow; and when this new arrangement has once been established, it is no easy matter to restore the organs to their former primitive condition. Age brings with it a relaxation of the tension of all the tissues, and the eye suffers temporarily with the entire system, but soon reäcts, having within its own constitution a principle of adaptation, according to the circumstances, habits and condition of the individual.

"From forty-five to fifty, a period when glasses are erroneously supposed indispensable, were they not resorted to at all, although there be a defective vision at the former focal distance—in reading, for example—the sight would soon begin to improve, and finally, to all intents and purposes, in a majority of instances would be reëstablished. It is a law, and strange it is that its indications are not more observed, that the eye at every period

of life will accommodate itself to the wants and necessities of the individual, provided it is not artificially deranged. Imperfect vision, the evils of near-sightedness, and the misfortune of not seeing distinctly in old age, were never heard of as being universal, till opticians had become numerous. We do not deny the utility of spectacles after they have been once resorted to; but we perfectly agree with Dr. Wallace, in saying that they are rarely necessary. Near-sighted children are often kept in that state through life, by being early furnished with concave spectacles. Withhold them altogether, and the eye would, in exact obedience to the laws of its organization, adapt itself to the labor required. But when the glasses are once put on, they must ever after be retained.

"Incalculable injury has been the result of the fashionable folly of wearing quizzing-glasses. Both gentlemen and ladies, in the spring-tide of youth, whose eyes are without a single defect, peep through these useless appendages of supposed gentility, till a permanent and incurable difficulty ensues that time has no power to correct, which consists in a want of agreement in the focus of the two organs. Unless the surface on which the image impinges on the retina perfectly agrees in both eyes, there will be distorted and indistinct vision—such as this kind of object or prospect glass produces."

MEDALS, &c. FORMED, BY PRECIPITATING COPPER FROM ITS SOLUTIONS, BY GALVANISM.

In our last number we gave some account of Prof. Jacobi's process, as practised by Mr. Spencer of London; since which, we have seen the operation fully performed, and take great pleasure in giving the details. The apparatus used by Mr. Peale of Philadelphia, is simply a wooden box, with a partition of plaster of paris in the centre, dividing it into two cells, in one of which is placed a solution of sulphate of copper, and in the other dilute sulphuric acid. A cast is made with type-metal of the medal to be copied, to which is attached a copper wire: a piece of zinc is also attached to a copper wire. On the partition or in its vicinity is placed a small cup containing quicksilver;

and after suspending the cast in the solution of sulphate of copper, (its back and edge being previously coated with beeswax, to prevent the copper precipitating on any other part except the face) and the zinc in the dilute sulphuric acid, the ends of both wires are placed in the cup of quicksilver, thus causing the connection to be complete. After remaining a sufficient time, (usually from one to three days) they are removed from the box, and the copper previously in solution is found precipitated in metallic form on the surface of the type-metal, perfectly aggregated and firm, giving a copper medal more precise and sharp than could possibly be formed by any other known means.

James R. Chilton, M. D. has been sometime engaged with experiments on this subject, and from his high reputation as a manipulator we may expect the most important results. Dr. Chilton has found it advisable to amalgamate the zinc before its immersion, which causes greater rapidity and certainty of action; also, to immerse while the solution is hot, and to keep the solution of copper saturated during the entire process, by suspending crystals of sulphate of copper, in a gauze bag, in the solution, which will dissolve as required. The whole process should be performed in a warm place to secure a good copy.

To amalgamate the zinc, it is only necessary to wet its surface with muriatic acid, apply pernitrate of mercury, and immediately immerse it in, or cover it with, fluid mercury.

We are informed that Mr. Joseph Saxton, of Philadelphia, was the first successful experimenter in this country; and from his specimens which we have seen, should conclude that his progress thus far is fully equal to that of the original discoverer.

Mr. Saxton exhibited, at the Franklin Institute, a copy from a pentographic plate, so perfect that it might readily be mistaken for the original: the polish, and even the marks left by the buff, were fully equal to the plate from which it was taken. He has also copied a Daguerreotype plate, which, when placed in a proper light, the mere difference in the quality of surface of the parts (for there can be no indentations) causes the picture to be visible. This could not be copied in any other way, as pressure would destroy so fragile an arrangement.

From these facts it is evident that wood cuts can be stereotyped in copper, if necessary, and be sharpened by the burin, so as to print with great beauty; or if metallic surface is all that is necessary to insure success in making copies by this process, an impression from a copper-plate, on paper, may be bronzed without destroying its sharpness, and the precipitate would give a copper-plate, from which others can be printed; the indentations caused by the raised ink being sufficient to receive ink in the same way as the original plate.

It is well known that other metals can also be precipitated with similar effects, and consequently the artist may model a vase with clay, from the outer surfaces of which a mould may be taken in type-metal, in which silver can be precipitated to any thickness over the whole surface equally, and the space between filled with copper by the same means: thus we have a silver-surfaced urn, highly ornamented, without the expense of chasing; and any number of duplicates may be made from the same mould.

To relieve the precipitate from the mould, it is only necessary to plunge both into boiling water, when the difference in their expansion will separate them. The precipitate may afterwards be annealed, if required, without injury, by placing the back-side of it on iron at a high heat.

Since writing the above, we have received Newton's London Journal, containing an impression of an etching on copper, and also an impression from an electrotype precipitated on the same plate, proving that a copper-plate may be duplicated any number of times, without injury to it. The impression from the precipitated plate is fully as sharp as that from the original. A precipitation was first made upon the original etching, which gave raised lines; on this a second precipitation was made, from which the impression was printed.

The following is extracted from a letter to Richard Taylor, Esq. by Edward Solly, jr. published in the London and Edinburgh Philosophical Magazine for April, 1840.

When the mould employed is perfectly clean and sharp, and the process has been properly conducted, the copy obtained is of pure and brightly metallic copper, usually of a pink color. If a copy of a medal

thus taken, and after having been removed from the mould, have a small quantity of copper precipitated upon its face, it assumes a most beautiful dead silky lustre, which with very little if any injury to the sharpness of the work, gives it a very beautiful play of light and shade.

The color of the precipitated copper appears to be very much influenced by the nature and condition of the mould; and by paying attention to this circumstance, it may be obtained of a great variety of shades of color. I have sometimes thought that the color of a voltaic cast of a medal is dependent on the nature of the metal of which the original medal is composed; because I frequently observed that copper precipitated in a fusible metal mould, made from a silver medal, had a remarkable whiteness, while those similarly made from copper medals were red, and from gold had a yellow color. On endeavoring to ascertain whether these effects were really dependent on the nature of the original medal, I found that so many little causes seemed to influence the results, that it was almost impossible to draw any certain conclusions with regard to these curious peculiarities of color. The surface of the deposited copper is exceedingly apt to tarnish from exposure to air, frequently becoming partially bright orange, and sometimes even of a brilliant red color. When heated up to nearly a red heat, it acquires a uniform iron-grey color which is perfectly permanent. The precipitated metal is rather brittle, though very elastic; but by heating it, and allowing it to cool slowly, it becomes tough and flexible.

In this process it is evident that a metallic surface is requisite for the commencement of any precipitation of copper: the arrangement, in fact, forms a single cell of a Daniell's battery, and is incomplete without the presence of the surface of the second metal in the sulphate of copper.

Mr. Spencer has shown, however, that moulds for the precipitation of copper may be made of any substance, by gilding them or otherwise covering their surface with a thin film of metal, which affords a conducting surface for the first portions of copper to be precipitated upon. My attention was early directed to this part of the process, because it seemed to open a wide field for new and beautiful applications. I was induced to pay particular attention to the deposition of copper upon non-metallic surfaces, and in consequence made numerous experiments to ascertain the circumstances most favorable to its precipitation under these conditions. My first experiments were made on surfaces of plaster of paris, which I endeavored to coat with copper, so as in fact to convert plaster casts into bronzes. I commenced by gilding the surface with different metals, in the manner proposed by Mr. Spencer; but I found it exceedingly difficult to get a perfectly smooth and uniform surface: the process succeeded best with gold-leaf; but even that had its objections, and was besides very expensive. Subsequently I tried metals, such as bismuth and antimony, in a state of very fine division, ground up with water and glutinous matters: these attempts were, however, not much better than the first trials.

In the course of these experiments I observed a curious fact, which I had not at all anticipated, and which very materially assisted me in attaining the objects which I had in view. When I had endeavored to precipitate lead from a solution of one of its salts, in the same way that

I had been doing with copper, I found that small grey crystals of lead soon formed upon the most prominent parts of the metallic mould I was employing, and which happened to be a leaden cast of a medal: these crystals rapidly increased in size, extending towards the membrane bag containing the zinc, which was about three inches distant from the mould. As soon as the crystals reached the surface of the membrane, they bent about in various directions, crossing and recrossing each other until they had completely enveloped the membrane in a net-work of reduced lead. Again: when silver is precipitated from the fused nitrate, by electricity, the crystals formed at the one electrode extend across the fused electrolyte, until having reached the opposite electrode, they complete the metallic circuit, and prevent further decomposition. In the same way I expected that when copper was deposited against a badly-conducting surface, it would increase much more rapidly in the direction towards the zinc rod, and that it would have but very little tendency to increase sideways; but I found, on the contrary, that the deposited copper had a remarkable property of extending by its edges far more rapidly than it increased in thickness; seeming to creep along or cling to the surface of the plaster or other non-conducting substance, against which it was being precipitated: and even when the plaster surface was placed at an angle of 45° to the zinc rod, and the deposition commenced in the centre, where a piece of gold-leaf had been applied, the copper extended equally all round, and quite as fast on the side, where it receded from the zinc, as on that part where by increasing it approached it. Following out this circumstance, I soon found that by very slightly improving the conducting power of the surface of the plaster or other non-conducting substance, I was enabled to precipitate copper without any gold-leaf or other metallic surface for commencement. The degree of conducting power requisite for this purpose was very slight; all that was necessary being to wash the surface over once or twice with a solution of nitrate of silver or muriate of gold, drying and well blacking each successive coat by exposure to light, the surface having previously been well rubbed over with a small quantity of plumbago. When thus prepared and placed in the solution of sulphate of copper, it was sufficient to touch any part of it with the wire attached to the zinc to cause the precipitation: a small ring of copper soon formed on the blackened surface round the wire, which increasing in size, in time covered the whole surface which had been prepared. When the deposit of copper had reached the edge of the prepared surface, it still continued to increase, but more slowly, extending around the edges, even on to the back of the plaster, and accommodating itself to all the inequalities of its surface almost as perfectly as if it were metallic. In this manner I have caused it to be precipitated along the surface of card-paper, and on a variety of the most delicate and easily destructible organic substances. Indeed I have frequently seen it, when arrested by an air-bubble, gradually surround and envelope it, and thus form a perfect cast; the process going on with sufficient rapidity, and yet without disturbing so frail a form.

Some of these experiments are interesting, when viewed in relation to certain phenomena of fossilization, not merely in cases where organic

matters are replaced by pyrites, but also in those where silica and other earthy substances are concerned.

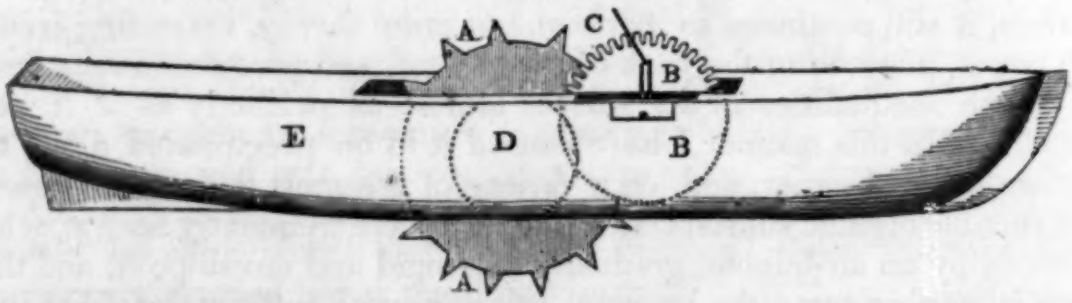
By this process I was easily enabled to cover the surface of any article moulded in plaster, sulphur, wax, or any other substance; but it usually happened that by the time the whole surface was covered, some parts had begun to throw up little mammilated excrescences of copper, which destroyed the smoothness and regular appearance of the surface. Although I thus failed in my original purpose, yet I saw sufficient reason to feel no doubt that plaster may be covered with a uniform coating of copper. The surface of the copper precipitated against the plaster is of course smooth, and therefore the process might be conveniently employed in any case where one or only a few copies are required of any metallic surface. Thus finger-plates for doors, and all kinds of thin, ornamental metal-work, may be copied with great perfection.

A very beautiful effect is produced by coating the surface of facsimiles of medals or casts, made of lead or fusible metal, with a thin film of reduced copper: they then exhibit the beautiful silky, dull appearance which I have before alluded to as being possessed by the precipitated metal. If these could be preserved from tarnishing by the application of any varnish or lacquer, exceedingly beautiful and cheap ornaments might be made in this manner, such as clock cases, &c.

I have likewise been engaged in a series of experiments on the precipitation of other metals by similar means, and shall probably, when sufficiently at leisure, prepare a short account of them.

Note.—The plan proposed by Mr. Solly, in using nitrate of silver for inducing precipitation on the surface of non-metallic bodies, has been anticipated by Dr. Chilton, who prepared paper in this manner, some time since, for the same purpose. Quere: Would not a single metallic point, passed through a plaster cast, and connected on the back-side with the wire, be sufficient to induce precipitation?

Report of the Committee on Arts and Sciences of the Mechanics' Institute, upon JOHN I. WEEKS'S *Canal Tow-Boat.*



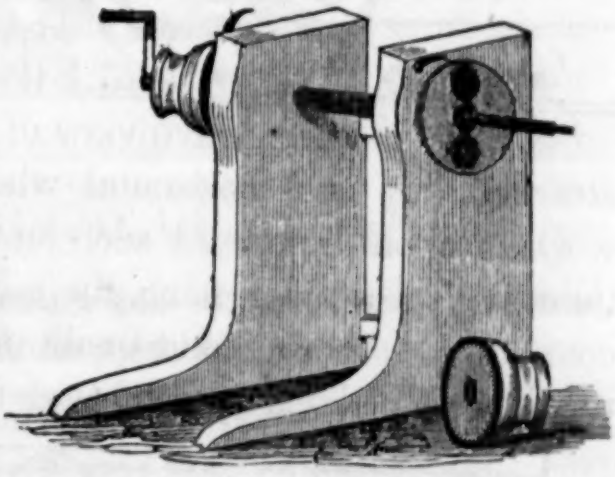
Description.—A is a toothed wheel revolving in a moveable frame, (not seen in the drawing) which is suspended by one end to the shaft of the wheel B. The wheel D, indicated by

the dotted circle, is permanently attached to A, and has cogs upon its periphery working into the cogs upon B. The *frame*, referred to above, is intended, by its suspensory position, to permit the teeth of A always to rest upon the bottom of the canal—its inclination varying with the depth of water. Motion is communicated to the machinery by an application of steam or other power to the shaft of B, and as will be seen the boat is propelled by the action of A upon the bottom of the canal.

The committee cannot doubt that a boat upon this plan, properly adjusted, will perform the duty required of it. An objection, and the only one made to it, based upon the possibility of injury resulting by its use to the bottom of the canal, the committee does not think valid.

WILLIAM A. COX, *Chairman.*

Report of the Committee on Arts and Sciences of the Mechanics' Institute, upon R. EVERETT'S *Improved Ship-Wrench.*



This invention is one of much value for river craft, or for lightly manned vessels having large sails, as the strength of one man in warping a vessel or making sail upon her, by this wrench, is nearly equal to that of four men expended upon the common wrench—with, however, the corresponding loss in speed.

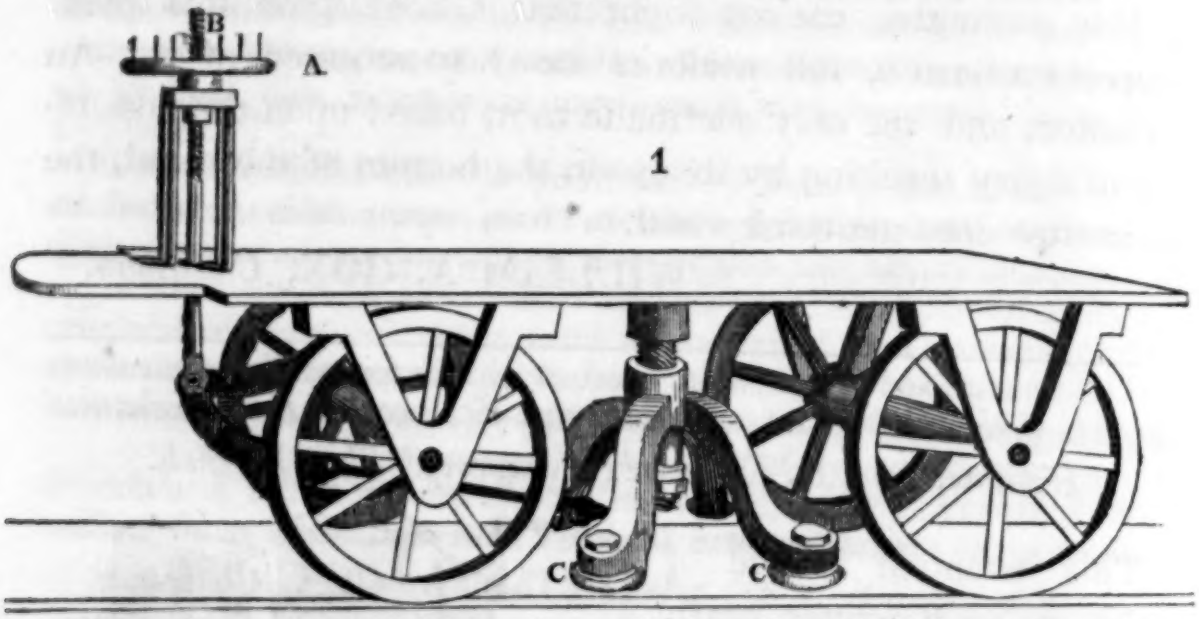
In general appearance, Mr. Everett's wrench resembles those in ordinary use, differing from them only by an internal alteration of the *heads*, a description of one of which will serve to show its action. Upon the axle is a cog-wheel, that works into two others placed upon the frame: these last communicate motion to the head, by working into cogs on the under side of the toothed band that is used to check a backward revolution of the head.

WILLIAM A. COX, *Chairman.*

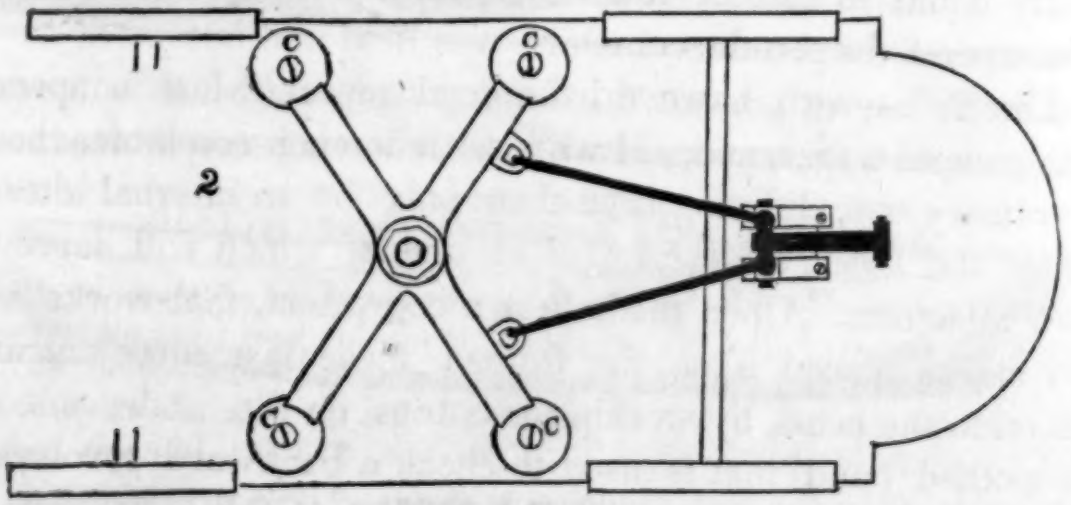
☞Mr. Noah Silleck, No. 38 Peck slip, is agent for the sale of Everett's Improved Wrench.

Report of the Committee on Arts and Sciences of the Mechanics' Institute, upon MATTHEW W. KING'S *Invention for preventing accidents upon Railroads.*

The objects of this invention are—1. To insure safety in the descent of cars upon an inclined plane.—2. To check suddenly, if necessary, and at all times with ease and certainty, the progress of a train of cars upon a level railway.—3. To prevent the common casualty of running off the track.



No. 1 is a perspective view of a truck, with the apparatus attached. A is a horizontal wheel, with a nut in its centre, working upon the thread seen on the rod B, and by its revolutions raising or depressing the rod; the motion from which is communicated through the quadrant, shown between the wheels, to the arms or levers placed under the centre of the truck.



No. 2 is a horizontal plan of the apparatus, representing the levers and their connection with the rod B. The action of A,

as stated above, will cause the small wheels C C C C, on the ends of the levers, to touch the rails on both sides, and produce the degree of friction necessary for stopping the train.

This arrangement admits of unlimited strength of materials; hence in its application to cars, it can in all cases be made equal to the circumstances under which it may be required to act. It has been supposed by some, upon a cursory examination of the machine, that the lateral pressure of the levers would be sufficient to throw the rails out of parallel. This supposition, however, is opposed to the results of many experiments, with the apparatus moving at different degrees of velocity, and it is believed that the comparatively slight pressure which is needed to produce the required friction, will, upon rails secured to their beds in the ordinary substantial manner, cause no injurious strain.

The committee have witnessed with pleasure the operation of a model of Mr. King's invention in the rooms of the Institute, from which they are led to believe that the projector's expectations as to its efficiency will be fully realized.

WILLIAM A. COX, *Chairman.*

NATIONAL ACADEMY OF DESIGN.

Proceedings of the Annual Meeting, held at the Society's Rooms, Clinton Hall, May 13, 1840.

The Council presented their annual report upon the general condition of the Academy, which was read and accepted.

The Treasurer presented his annual report, which was read and accepted, accompanied with the following supplement:

Supplement to the Treasurer's Report of 1840.

GENTLEMEN—By reference to the statement of the accounts herewith furnished, you will find the total receipts of the year from all sources, to be $5798.28; and the total expenses during the same period, $5798. 27. Of the receipts, it will be perceived that they include the amount withdrawn from the invested fund, to wit, $1300. Interest money receivable, $313.39; rent of the apartments, $100; exhibition of the Vattamare collection, $140.49: leaving the balance $3944.40, being the net receipts of the annual exhibition of 1839, which is $754.80 less than that received at the exhibition of 1838. It will also be observed that

the expenses exceed those of last year $627.42. Hence the necessity of applying to the invested fund to meet this contingency, which occurred after the amount marked as "invested" in this year's account had been funded, and as it afterwards proved, was more than could be spared to be carried to that fund. Among the expenditures are included $101.92, required to repay money advanced by the Treasurer on last year's account, and which of course forms no part of this year's expense; $2000 carried to the invested fund, an amount equal to that of last year; and the extra expenditures dependent on circumstances, and subject to the decisions of the Council, of $690.94; and in the same class may be further included the amount of expenses chargeable on the exhibition of the Vattamare collection of drawings, of $231.82, showing a loss on *that exhibition* over the receipts of the same of $131.82, (so far as ascertained, exclusive of gas bills, which are inseparable from the general accounts.) The general expenses of the institution amount to $2773.89, and exceed those of last year of the same class by $303.03, which have of necessity increased with the progress and enlarged accommodations of the institution; and in this amount is included $500.44, the expenses of the schools, (at present free of all charge to students.) Of this latter amount, $305 at least is chargeable to the Life School, by far the more expensive of the two.

While on this subject, the Treasurer would respectfully call the attention of the Academy to *an extension* of the advantages of the Life School, as the limited number attending this season, at no time more than *eight*, has advanced the average cost of each student to $40; an amount greater, it is believed, than contemplated by the Academy; and as the expenses of this School are in no way increased by an addition of students, it is believed that it may prove of benefit to the student, and no loss to the Academy, to *extend its advantages.* In the event of an increase proving impracticable, either from a want of proper applicants for admission, or from its being deemed injudicious or inexpedient to admit a greater number, it may, with the above facts before you, be a matter for consideration if it is desirable to continue the School, at so great an expense to the Academy. This is submitted, although somewhat out of the province of the Treasurer's department, under the belief that the information cannot readily be gathered from any other source, as the statistical facts are exclusively in this department. The invested fund of the Academy, at present on interest, amounts, exclusive of the late drafts, to $6000, which has under the direction of the Council been, as is believed, safely and properly invested. Of this latter amount, a portion will be required to enable the Academy to furnish and arrange their rooms in the new building, with all proper fixtures and accommodations for their occupancy by the *institution.*

With these facts before you, gentlemen, I believe you have a concise and full view of the financial affairs of the Academy; and the present flourishing condition of the same must be a matter of sincere gratification to every member.

All of which is respectfully submitted by your very obed't servant,

THOS. S. CUMMINGS, *Treasurer.*

New-York, May 13th, 1840.

After which, the following officers and members were elected:

SAMUEL F. B. MORSE, *President.*	AND'W RICHARDSON,	*Members of*
HENRY INMAN, *V. President.*	ROBERT E. LAUNITZ,	*Council.*
JOHN L. MORTON, *Cor. Secretary.*	G. MARSIGLIA, T. COLE,	*Academicians.*
JAS. WHITEHORNE, *Rec. Sec'ry.*	E. MOONEY,	
THOS. S. CUMMINGS, *Treasurer.*	J. F. E. PRUDHOMME,	*Associates.*

Who, together with the Council, constitute the Committee of Arrangements for the next year's exhibition. The meeting then proceeded to the election of members:

Academicians:
D. HUNTINGTON, E. MOONEY, F. W. EDMONDS.

Associates:
W. H. POWELL, MISS S. C. FROTHINGHAM, J. W. AUDUBON, V. G. AUDUBON, LEWIS P. CLOVER, T. P. ROSSITER.

Honorary Members:
JOHN FRAZEE, ORVILLE DEWEY, HENRY SARGENT, ALFRED T. AGATE.

Prof. Perspective: HENRY BAYLIS, Esq. *Prof. Anatomy:* Dr. WATTS.

REVIEW OF THE EXHIBITION.

The fifteenth annual exhibition of the National Academy of Design is now open, and presents many pictures worthy of a place in any collection. It is daily crowded with the lovers of art, who are amply rewarded for their visit.

In such calamitous seasons to the trading community as the last, artists receive but few commissions, and consequently the friends of the institution feared the exhibition would not contain its usual attractions; they have, however, been greatly and agreeably disappointed. There are some twenty pictures in this exhibition, which, alone, would be sufficient to entitle it to the highest praise.

It is unfortunate for the Academy that almost every visitor imagines himself a critic. Many, without discrimination or judgment, include the best pictures with the worst in a general censure; sometimes, we are fain to think, from the first being beyond their comprehension. If these sapients would be contented with the large number of good pictures, (which is many times greater than could possibly have been anticipated) and recollect the fact that young artists can only judge of the power of their pictures by comparison with other and better works,

they would perhaps see the necessity of occasionally admitting the productions of juniors for their own benefit.

It may be unwise for us to find fault with brother editors; but as we intend that our criticisms shall be fearless, we must enter the field by attacking our own craft. The principal city journals have published criticisms on this exhibition, and really some of them are shameful. The pictures which one praises another pronounces worthless. Many are praised without desert; and others, truly deserving, are left unnoticed. Not contented with such errors, they occasionally draw comparisons between artists, which are as often erroneous as true: thus deserving aspirants are crushed, before their talents are fairly developed. It is morally wrong to publish criticisms written by those unacquainted with the arts; and the proprietors of papers containing them, should be punished as severely as those who tarnish the credit of a merchant or the character of a female. We do not intend these remarks to apply to *all* the critiques which have appeared, but are sorry to say that but few have been properly conducted. We know of one instance where the reporter of a paper was ordered to write a criticism; and after visiting the exhibition once, and that in the evening, he absolutely wrote a most definite denunciation against many of our best artists, and praised many very indifferent works.

Our space will not permit us to notice *all* the pictures: we shall therefore select those which, for their merits or demerits, most deserve attention.

No. 8. *Miniature of Rev. Dr. Wainwright; by G. Harvey, A.* We are sorry to be under the necessity of commencing our remarks by disapproving of this picture, as there is much about it to assure us that the artist can do better. He has made a bad choice of position for the hand, thereby requiring it to be so much foreshortened that he has failed in the drawing. The tone is too florid and general: the lower part of the head should contain more grey tones, instead of a local color of such sameness: it wants articulation, and thereby loses force.

9. *Design for a Hotel near West Point, in castle style of architecture; A. J. Davis, A.* This is one of the many good specimens we have seen of the fertile imagination of this architect.

Mr. Davis has done too much to improve the architecture of our city, to require praise from us.

10. *Engravings; by A. Sealey.* We are not sufficiently *au fait* to judge of the mechanical part of this gentleman's productions; but the engraving of W. Leggett, Esq. from a picture by Cummings, loses its force entirely, unless viewed within twelve inches. This may have been the fault of the painter; but from what we know of his works, we fear the fault is with the engraver. When viewed closely it is very creditable, and gives promise of future fame.

11 and 12. *Miniatures; by Miss S. C. Frothingham, A. (elect.)* These are truly good for one so young in the art. No. 11 has a fine, fleshy tone, and we could fairly be considered fastidious if we named a single fault.

13. *Frame of Miniatures; by Carl Weinedel, A.* All highly finished, with great labor. The likeness of the artist, by him self, is an excellent picture.

14. *An Old Building, at Kentish Town, London; J. W. Hill.* A free and spirited sketch.

17. *Spring, a miniature; G. A. Baker.* This is attempting more than can usually be successfully accomplished. There is much to please in the head; but the back ground and some of the accessaries are faulty.

18. *Frame of two Miniature Portraits; T. S. Cummings, N. A.* These are in Mr. C.'s best style. The junior head is unquestionably the best we have ever seen in miniature: the drawing is fearless and correct, while the color and general arrangement challenge competition. We have had occasion to say much in favor of this gentleman's works; but never did we feel ourselves so inadequate to the task as in the present instance. The miniatures of Malbone and Cummings will long be remembered as the *chef d'œuvres* of American miniature painters.

20. *Engraving of the Rev. Orville Dewey; by H. S. Ladd.* We cannot withhold our commiseration, both for the original and the painter, (Mr. Frothingham.) So fine a head, and so good a picture, deserved better treatment.

28. *Portrait; J. H. Shegogue.* This portrait is extremely creditable as a composition, as are most of this artist's produc-

tions. The position is easy and classical, and free from that stiffness and constraint which is a frequent fault in portraits.

33 *Miniature Portrait of Thomas Fox, Esq.; T. Fox.* A forcible miniature, but in complexion a little chalky.

38. *Gipsy Girl; Miss J. Stuart.* Painted to a high scale of color, and much more forcible than some other pictures by this artiste.

42. *Full-length Portrait of a Child; C. C. Ingham, N. A.* The figure of the child is most accurately drawn and beautifully painted; but we feel compelled to disapprove of the back ground, which is leaden in tone, and wanting in aërial perspective.

43. *The Sisters; J. Whitehorne, N. A.* As likenesses, they are unexceptionably good, and form a very pleasing picture. This artist has advanced very rapidly, and will undoubtedly realize the fondest hopes of his friends.

44. *Portrait of a Lady; W. H. Powell.* A most able sketch or half-finished picture, full of fine classical taste, and would do much honor to an older artist. We have strong presentiments that this young gentleman is destined to astonish his friends.

49. *A View of the Mountain Pass called the Notch of the White Mountains; Thomas Cole, N. A.* The name of this artist is sufficient to guaranty its excellence. Mr. Cole has attempted much, and, as usual, has succeeded. The high scale of color necessary to represent American autumnal scenery, renders it a work of great difficulty; and even Turner, so celebrated for this particular style of art, might be proud to own the picture.

50. *Portrait of a Gentleman; D. Huntington, A.* This portrait contains one unusual excellence—a well-drawn hand: the other parts are fully equal to the artist's former attempts.

51. *Portrait of a Young Lady; C. L. Elliot.* The drapery and other accessaries are too brilliant, rendering the picture rather a portrait of the dress than of the face. It is really inexcusable to introduce so much in a mere portrait: the eye is at once diverted from the head, which in this picture (if not in all others) is entitled to be the principal attraction.

52. *Portrait of Nicholas Biddle, Esq.; H. Inman, N. A.* A composition worthy of a Lawrence; for, although a portrait,

the attitude and general arrangement of effect fully entitle it to this appellation: coloring warm, glowing, and effective, and fully sustains the high reputation of the worthy Vice President.

54. *Portrait of J. Scholl, Apiarian; J. H. Shegogue.* Highly characteristic, and an excellent likeness of the philanthropic original.

58. *The Whistle, or The Infancy of Henri of Bearne; W. Page, N. A.* A daring and successful composition. The artist, as usual, has selected circumstances and arrangements of color replete with difficulties, all of which have been perfectly mastered. The child is not an exaggerated specimen of infantile beauty, but possesses all the nature and consequent departure from symmetry usual at so early an age. It is a general fault to paint children Cupids; whereas, artists should be content to let parents think them so. The head and hand of the father are admirably depicted, and the headdress of the mother is beautifully finished.

61. *Infant Juno: Portrait of a Little Girl; G. Marsiglia, N. A.* The whole merit of this picture is due to its finish: the drawing is faulty, and the accessaries overwhelming.

63. *Portrait; Jas. Frothingham, N. A.* Pure in color, tone, force, depth, and strength: it lacks nothing, for it is a complete triumph of art.

67. *Scene near Pittsfield, Mass.; V. G. Audubon.* An admirable landscape, truly painted, and entirely free from clap-trap. The artist has copied nature with beauty and truth.

85. *Captive Knight; F. W. Philip, A.* A good cabinet picture, much in the style of Rembrandt, without at all losing originality. Mr. Philip has been six years in Europe, and made the most of his time. His studio presents several hundred specimens of his zeal, and his untiring industry will undoubtedly meet its just reward.

93. *The Architect's Dream; T. Cole, N. A.* A most gorgeous display of architectural beauties, and fully sustaining the high reputation of the artist.

103. *Landscape from Nature; Richardson, N. A.* One of Mr. R.'s happiest efforts, which are always pleasing when painted from nature.

105. *Child; J. G. Chapman, N. A.* We cannot understand how so good an artist as Mr. Chapman should produce a picture so entirely void of interest. It represents a child on a bed, in a state of nudity, apparently too young to raise its head, but still holding it constrainedly erect; and unless it was intended to represent the little subject as sliding off, there is some gross error in the drawing, for such is certainly the impression of every person visiting the exhibition. Each part, viewed separately, is well painted; but we have a right to expect the *tout ensemble* to be equal to the individual parts, in pictures emanating from such a source.

114. *Indian Girl; J. E. Freeman, N. A.* There is much to admire in this picture; and would the artist copy nature closely, and not attempt to represent her more gorgeous than she really is, he would undoubtedly improve his style.

126 and 133. *Landscape compositions—Morning and Evening; A. B. Durand, N. A.* We have on a former occasion given Mr. Durand the appellation of the "Admirable Crichton" of art. Nothing seems amiss to him. A few years since, he was unquestionably the first engraver in the country, and had few equals in Europe: in less time than would ordinarily be consumed in learning mere manipulation of materials, we find him equaling our first artists in portraiture and composition: another short space has elapsed, and he produces landscapes too full of beauties to be catalogued in a mere criticism. There is but one branch of art left for his restive genius to cope with; and that is sculpture: should he attempt it, we have no doubt of his success.

132. *Portrait of a Lady; C. C. Ingham, N. A.* The highest praise we can bestow upon the portrait of a lady, is to say it was painted by this artist.

160, 161, 162. *Portraits; F. Cruikshank.* These pictures are more effective and perfect than any we have ever seen executed with the same materials: they are painted with water colors, on Bristol board, and have all the force of oil. F. Cruikshank stands alone in this style of art. Did the collection contain no other pictures than these, it would be worthy of all the attention it has received.

183. *Disappointed Bachelor; W. S. Mount, N. A.* We are happy to see that the American Wilkie has at length turned his attention to this all-important course of thought; for unless he had done so seriously, he could never have produced so characteristic a composition.

195. *Portrait of the late William Dunlap, Esq.; C. C. Ingham, N. A.* This portrait of the late venerable Vice President is really a breathing likeness: we could scarcely convince ourselves that the original was not before us: his very character and disposition are depicted. We hope this picture may be purchased by the Academy.

220. *Portrait of General Hamilton; J. Frothingham, N. A.* In addition to other excellencies before named as belonging to this artist's works, the portrait before us bears an impressive style of grandeur or command worthy the original.

230. *The City and Country Beaux.* 234. *Sparking: F. W. Edmonds, A.* These compositions are truly wonderful; and were they the production of one who had spent a life-time in the pursuit of his art, they would entitle him to a high standing. Mr. E. is an amateur, and does high honor to himself and country.

219. *Inhabitants of Athens celebrating the arrival of King Otho at the Tomb of Lysicrates: J. Petzl.* This picture is entirely wanting in a proper disposition of light and shade, and consequently its beauties are overlooked. Upon examining it closely, we were really surprised to find the figures, individually, well drawn and highly finished. Each by itself would form a gem; but the *tout ensemble* is spotty and disagreeable.

(TO BE CONTINUED.)

LUSUS NATURÆ.

A few weeks since we saw a horse in Baltimore with a worm in the aqueous humor of its eye. It had been observed for a month, during which time it had increased from one-half to three and a half inches in length. Its motion was continuous, as with an eel swimming, and the horse seemed to suffer no pain. The cornea was slightly opaque, and the eye will doubtless become prematurely blind. The worm is of the genus filaria, class nematordia, or thread-like worm of Rudolphi.

PROGRESS OF SCIENCE.

On the Galvanic Properties of the Metallic Elementary Bodies, with a description of a new Chemico-Mechanical Battery. By ALFRED SMEE, *Esq. Communicated by the author.*

Last May, a number of experiments were performed upon the galvanic properties of the non-metallic elementary bodies, and these were attended with the acquisition of some curious information, but till lately no opportunity has presented itself of extending the series of investigations then conducted: now, however, that I believe I can lay before the public a valuable battery, no time is lost, that others may extend and improve the new principle about to be detailed.

With regard to the metallic elementary bodies, their properties have been investigated so frequently, and to such an extent, that it may seem unnecessary to draw attention again to them; but two circumstances influencing their action have never been noticed. It is well known that the positive metal should be the most readily acted upon by the solution, and the negative the least, and the further these are apart, the more forcible will be the battery: thus, *cæteris paribus*, platinum and zinc are more powerful than iron and zinc; but if a circuit be made of a piece of smooth platinum and zinc, it will sometimes happen that the effect is less than when a circuit is formed by a similar piece of iron. Now this appears at first sight paradoxical, though it can in many instances be easily explained; for if the platinum be carefully examined, it will be seen that the acid solution does not really wet the platinum, but runs off from the greater part of the surface, as metallic mercury does from glass. In this state, a piece of platinum having a surface of thirty-two square inches, formed into a battery with amalgamated zinc, and connected with a magnet, supported three-quarters of a pound through five thicknesses of paper: when the same piece of platinum was heated or dipped in nitric acid, and afterwards well washed, it supported a similar weight through twelve thicknesses of paper: thus being less powerful than iron in the first instance, and more so in the second. In the same way, silver supported, under the like circumstances, the keeper of a magnet through three layers of paper: on being heated and again wetted, the attractive force was exerted through nine thicknesses of paper, but no additional power was gained by removing the surface of the silver by nitric acid. The metals in these cases appear to become coated with a film of air, which effectually prevents the contact of the fluid. This is also seen in the various forms of charcoal, which after ignition are very powerful, but lose much of their force if long exposed to the air; their energy however is restored upon their being again heated.

As in the experiments just detailed, and in those which I am about immediately to describe, the relative powers of the arrangements have to be considered, it will be proper to mention in what way the results were obtained. A soft iron horse-shoe magnet was suspended, round

which covered wire, in communication with the poles of the battery, was wound: the keeper, which weighed three-quarters of a pound, was separated from the poles of the magnet by as many layers of thin blotting-paper as could be used without its falling: thus with a battery of feeble force, few layers of paper could be interposed; but with one of greater strength, forty or sixty thicknesses might be used. A similar form of apparatus might easily be devised, which would show by means of a delicate screw the exact distance at which a given weight would be supported by the attractive force of the induced magnet.

The influence of different conditions of surfaces is a subject which has escaped all experimenters. Now this is singular; for many must have noticed, that in a circuit, the greatest quantity of gas is given off at the corners, edges, and points. Following this hint, a piece of spongy platinum, consisting as it does of an infinity of points, was placed in contact with amalgamated zinc, when a most violent action ensued, so that but little doubt could be entertained of its forming a very powerful battery. The fragile nature of this material precludes it from being thus used, and therefore it was determined that another piece of platinum should be coated with the finely-divided metal. This experiment was attended with a similar good result, and the energy of the metal thus coated was found to be surprising. To test the value of this process, a piece of platinum, thus platinized, was placed in dilute acid in contact with amalgamated zinc, and the quantity of gas evolved in a given time was noticed.

Platinized platinum,	7 sq. in.	gave off	5 cub. in.	per	1 min.
Platinum heated,	"	"	1	"	"
Platinum covered by air,	"	"	1	"	6 min.
Platinized coke,	small piece,	"	3	"	5 min.
Plain coke,	"	"	1	"	25 min.

In these experiments the contact was made in each cell alike; the same zinc being used, and the distance being the same between the metals. The energy of the metal thus prepared upon the soft iron magnet is very great. A piece of platinum exposing thirty-two square inches of surface, supports three-quarters of a pound through seventeen thicknesses of paper, whilst when smooth and wetted it supported it through eleven layers; and when no care was taken about its being wet, but when simply plunged into the liquid, only through five layers of the same paper.

The cause of this increase of power appears to be the facility given to the evolution of the gas from the number of points, and not from an increase of surface, as but little benefit attends its application in the nitric acid batteries, in which the hydrogen is not evolved, but absorbed by the fluid.

The next point which we have to consider is, whether other finely-divided metals have the same good effect; but no other of the many metals that I have tried can be used with similar good results, except palladium, which though it has not much effect in the sponge, is found when precipitated on platinum or silver, to possess powers about equal to the finely-divided platinum. Precipitated silver increases the power of the metals, but not nearly to the extent of platinum.

Having ascertained that a solution of platinum must be used for increasing the power of metals in their ordinary state, it becomes a matter of great importance to ascertain whether the platinum may be precipitated upon other metals with advantage; and for this purpose it was deposited upon earthenware, palladium, pure silver, copper plated with silver, nickel, German silver, tin, lead, brass, cast iron, sheet iron, steel, zinc, and charcoal. The platinized earthenware was not found to answer, apparently from the quantity of the metal not being sufficient to carry the electricity. Palladium, silver, and plated silver answered equally well with platinum to receive the precipitated metal, and if there was any difference, I think the silver was rather the best. Plated copper answers very well, but care should be taken to varnish every copper edge, or else that metal is apt to be slightly dissolved, and deposited again upon the platinized silver, which is injurious. Should copper from any cause get upon the silver, it may be dissolved by a little muriatic acid, and afterwards by a little strong ammonia. No other metal or alloy besides this answered for the reception of the platinum, except iron, and this was as active as silver for a time, but then a local battery was formed between the platinum and iron—the iron was dissolved and the battery destroyed. In some cases this does not take place so rapidly as in others. Carbon answers admirably for the reception of the platinum, and is improved in like manner.

We have now the elements for the manufacture of a powerful battery; for we have seen that increase of power is obtained by taking care that the negative metal is thoroughly wetted by the fluid, and that this is not only accomplished, but its power materially increased by the numerous points formed by the precipitation of finely-divided platinum. Whatever metal, alloy, or compound may be found hereafter to succeed for the reception of the platinum, or whatever metal may be found to answer instead of the finely-divided platinum, still the principle by which the advantage is gained will be the same. However, the battery which I now propose is to be made of either copper plated with silver, silver, palladium, or platinum. The silver can be rolled to any thinness, and therefore is not expensive. Each piece of metal is to be placed in water, to which a little dilute sulphuric acid and nitro-muriate of platinum is to be added. A simple current is then to be formed by zinc placed in a porous tube with dilute acid; when, after the lapse of a short time, the metal will be coated with a fine black powder of metallic platinum. The trouble of this operation is most trifling, only requiring a little time after the arrangement of the apparatus, which takes even less than the description. The cost I find to be about 6d. a plate, of four inches each way, or 32 square inches of surface. This finely-divided platinum does not adhere firmly to very smooth metals; but when they are rough, is very lasting, and sticks so closely that it cannot be rubbed off. On this account, when either silver is employed, or copper coated with silver, the surface is to be made rough by brushing it over with a little strong nitric acid, which gives it instantly a frosted appearance; and this, after being washed, is ready for the platinizing process.

With regard to the arrangement of the metal thus prepared, great diversity exists. It may be arranged in the same way as an ordinary Wollaston's battery with advantage; a battery thus constructed, pos-

sessing greater power than Professor Daniell's battery: four cells, containing 48 square inches in each cell, decomposed 7 cubic inches of mixed gas per five minutes, whilst four cells of Professor Daniell's, in which 65 square inches of copper were exposed in each cell, gave off only five cubic inches in the same time. However, in my battery thus arranged, the action dropped to 5 cubic inches in five minutes, but it resumed its power after the contact had been broken for a few seconds. This battery also possesses great heating powers, raising the temperature of a platinum or steel wire, one foot long and of a thickness similar to that used for ordinary bird-cages, to a heat that could not be borne by the finger.* Its magnetic power is not less astonishing; three cells supporting the keeper of a magnet through 45, two cells through 32, and one cell through 20 thicknesses of paper. An electro-magnetic engine was made to rotate with great velocity; the combustion of the mercury at the breaking of contact being exceedingly brilliant.

A battery of this construction should be in every laboratory, to be used in most cases where a battery is wanted, and the slight labor attending its operation is scarcely worth mentioning. I have used one for 48 hours consecutively, without the slightest alteration either of the fluid or in the arrangement of the metals, and the diminution attending its operation appeared to arise from deficiency of acid; for it was instantly restored by a little strong sulphuric acid in each cell. Where the battery is required to possess the same power for a long period, it might be advisable to separate the metals by a porous earthenware vessel, or what answers the purpose equally well, by a thick paper bag, the joinings of which must be effected by shell-lac dissolved in alcohol. By these means, the sulphate of zinc is retained on the zinc side of the battery. The use of porous tubes, however, appears from observation, as far as my battery is concerned, to be nearly superfluous—at any rate in most cases; for I find, that after a battery arranged as Wollaston's, had been at work in the same fluid for 48 hours, it had no zinc deposited on the silver. It is worth remarking, that during the last 24 hours contact had not been broken for a single instant. Notwithstanding these experiments, however, it may be as well in an extensive battery to use porous plates.

The battery may be arranged like the pot batteries; but I should greatly prefer the troughs, such as used for Wollaston's batteries, from the convenience of packing, and from a battery of the same surface requiring so small a space. A battery may be constructed to form a most powerful calorimotor. It may also be arranged as a circular disc battery. Or it may be made as a Cruickshanks, each cell being divided or not by a flat, porous diaphragm. Whatever arrangement is adopted, the closer the zinc is brought to the platinized metal, the greater will be the power.

The generating fluid which is to be employed is water, with one-eighth of sulphuric acid by measure; and the zinc ought always to be amalgamated in the first instance, as that process will be found very

* A small pot battery of six cells, fairly fused into globules two inches of iron wire, and the combustion of different metals was extremely brilliant, when the battery was in combination with a Bachoffner's apparatus.

economical from its stopping all local action, and the amalgamation will be found not to require repeating, because there is no fear of copper being thrown down on the zinc, which occasionally happens in the sulphate of copper batteries.

The battery thus constructed is the cheapest and least troublesome in action that has ever been proposed, and from the smallness of its bulk will be found very valuable to electro-magneticians. It is second in power only to the nitric acid batteries, the objections to which have been already noticed. For medical purposes, with a Bachoffner's apparatus, a battery composed of platinized silver two inches each way will be found sufficient.

To recapitulate the processes of the formation of a battery: first, the platina, silver, or plated copper must be roughened, the two latter with nitric acid, and afterwards washed. The metal is next to be placed in an acid solution with a little nitro-muriate of platinum, which metal is to be thrown down by the formation of a simple galvanic circuit; and lastly, the platinized metal is to be formed with amalgamated zinc into a battery, either with a porous tube or paper bag, or without them, according to the fancy of the operator, or the purpose for which it is wanted.

The advantage from this form of battery arises, as I believe, from a mechanical help to the evolution of the hydrogen; and therefore it is proposed to call it the chemico mechanical battery. This battery may remain in the acid for a length of time, and neither the amalgamated zinc nor platinized silver will undergo the slightest change, and the whole will be as silent as death. Let only communication be made, the liquid in each cell becomes troubled; it boils—it bubbles—and produces the effects which have been detailed. The quantity of electricity passing through either wires or liquids may be pretty accurately judged from the action taking place in the battery, for if the communication be made through a liquid of difficult decomposition, or through long small wires (70 or 80 feet), but little gas will be given off from the platinized metal; but when short, thick wires are used, the action is violent. A galvanometer might be constructed of one cell, similar to the oxygen cell of Professor Daniell, as this would show the exact amount of electricity passing.

The importance of constructing a battery that shall be small in compass, efficient in action, cheap in its operation, and devoid of troublesome manipulation, is important in the highest degree; and I consider that my chemico-mechanical battery will be found frequently a useful means of obtaining gases for the oxy-hydrogen light. Its value for blowing up vessels under water, and exploding powder in mines, is sufficiently obvious.

In conducting the extensive series of experiments, of which this is a summary, the grand features have been rather attended to than very minute results; and in conclusion, it would ill befit me if I did not here mention the valuable assistance I have received by the loan of apparatus, &c. from many individuals, but most especially from Professor Daniell. William Terry, Esq. and Mr. E. Palmer.

London and Edinburgh Phil. Mag.

On the best means of burning Gas for supplying Heat. *By Sir* John Robison.

When carburetted hydrogen gas is employed in producing heat, it is seldom required that it should at the same time give out light: the combustion may therefore be managed in any way which may be convenient, without seeking to preserve the illuminating power. It appears to have occurred about the same period to the late Dr. Duncan and to myself, that, by passing a current of gas, mixed with atmospheric air, through a wide vertical tube, having its upper end covered by a diaphragm of wire-gauze, and by kindling the mixture as it escaped through the interstices of the wire-cloth, a convenient stove might be formed for culinary purposes. Dr. Duncan applied some small apparatus on this principle to pharmaceutical operations in his class-room, and I had my kitchen furnished with a range of large stoves, which were intended to supersede the use of French charcoal-stoves in various culinary processes. In both cases the success has been perfect, and the same principle has since been adopted with advantage in a variety of processes in the useful arts, where this neat and cleanly method of applying heat has rendered it a valuable acquisition to the work-shop. The form of the apparatus may be varied in any way to suit the particular process to which it is to be applied; as all that is essential is, that a current of the mixed gas and air shall rise through wire-cloth, and that the proportion of gas to atmospheric air shall never be so great as to allow of the flame becoming yellow, as, with this precaution, the combustion of the carburetted hydrogen will be complete, and no deposit of soot will take place on cold bodies when set over the flames: the proper quantity of gas in the mixture is easily determined by the stop-cock belonging to each stove.

For ordinary culinary purposes, the cylinders may be thirty inches long, and three to four inches diameter, and the wire-cloth for the tops should have about thirty wires to the inch. That which is manufactured for safety-lamps answers well for this purpose.

Whenever, from accidental injury or decay, a hole takes place in a diaphragm, it is no longer possible to use it; as, when lighted, the flame passes through the fracture, and communicates with the jet at the bottom of the cylinder, which then burns like an ordinary gas-light, and like it, would blacken the surface of any cold body presented to it. The wire-cloths, if not broken through by violence, will last for months although in daily use; and, if covered by a layer of coarse sand or pounded limestone, will continue serviceable for an unlimited period.

When more intense heat is required than is attainable by the unaided combustion of the mixed gases, recourse may be had to various forms of blow-pipes; and when a large volume of such flame is to be employed, the current of atmospheric air may be urged by double bellows. A very efficient apparatus on this principle is to be seen in the laboratory of Dr. D. B. Reid.

It is to be regretted that such applications of gas are not more generally known and introduced into workshops, as there are numerous processes in the arts in which they would afford facilities to the workman which he can scarcely command by any other means. For example:

in the hardening of steel tools, it is well known that a piece of bright steel, when heated to redness in a forge or muffle, is subject to oxydation, and that a black scale remains after hardening, which it is difficult to remove without some injury to the work, as in the case of a screw-tap; whereas, if the same piece of steel be heated in a flame of the mixed gases, where there is no free oxygen to attack its surface, it may be *made and kept* red-hot without any injury to its finest edge: it will be discolored, but without losing much of its polish. The artist has also the advantage of a distinct view of the article while it is being heated, and the power of withdrawing it from the flame the moment it has acquired the proper color, which, in the hardening of cast-steel cutting tools, is of great importance.

Many attempts have been made to apply carburetted hydrogen and pure hydrogen gases to the purposes of warming buildings, and various forms of stoves have been proposed, on the understanding, it would appear, that by applying the flame of the gas to metallic bodies, an increased degree of heat would be communicated by them to the atmosphere around. A little consideration will show, that however the *distribution* of heat may be modified by such contrivances, there can be no increase of the heating power; and that when a certain measure of gas is fairly burned, the heat evolved into the apartment will be the same, whether the flame be disposed as a light, or made to play against metallic plates or other combinations of apparatus. In all cases where the products of the combustion are allowed to mix with the atmosphere of the apartment, without provision being made for carrying them off by ventilation, the effects of such processes must be more or less deleterious to health, according to the proportion these products bear to the mass of air they mix in. On the whole, it may be assumed, that this mode of heating apartments is the most expensive, the least efficient, and, excepting that by Joyce's charcoal stove, the most insalubrious that can be resorted to. Edinburgh New Phil. Jour.

On the best method of burning Gas for the purpose of Illumination.
By Sir JOHN ROBISON.

The theoretical principles on which carburetted hydrogen gas may be used with the best advantage, for the purpose of domestic illumination, have been so well laid down by the late Dr. Turner, and by Dr. Christison, as well as by other chemists, that it would be superfluous to enter at all on this part of the subject in a paper, the object of which is to give such practical directions for the proper construction and management of gas-fittings, as may lead workmen to give the requisite forms and proportions to the parts, and may enable the consumers to obtain the quantity of light they require, from the smallest practicable expenditure of gas, and with the least possible inconvenience from the product of its combustion.

It is very generally believed by workmen and others, that the more freely the current of air is admitted to an argand burner, the better will be the light; and hence the burners and glass chimneys in ordinary use are made in such a way as to favor this view. No practice, however, can be more incorrect, or can lead to less economical results. An

attentive observation of what takes place will show, *that there is only a certain proportion of air required for the favorable combustion of a definite measure of gas.* If more air than this due proportion be allowed to pass up the chimney, the size of the flame will be reduced, and the quantity of light diminished: if, on the other hand, less than the due proportion be admitted, the surface of the flame will be increased by elongation, but it will become obscure, and the quantity of light will decrease, owing to the escape of particles of unconsumed carbon. A simple experiment will exemplify this. If the flame of an ordinary argand burner be reduced, by partially shutting the cock, to about half an inch high, the light will be pale and blue, because the supply of air is too great for the small quantity of gas which is issuing. If partial obstruction be given to the access of air, by applying a handkerchief under the burner and chimney, it will be found that the size of the flame and the quantity of light emitted will increase until it arrive at a maximum, when, by farther obstruction, the admission of air will be reduced below the proportion required for the burning of the carbon, and the light will diminish.

It appears, therefore, that the proportionate size and shape of the burners, and the diameter and height of the glass chimneys, are by no means indifferent matters, but that much advantage may be gained or lost by giving them such forms and proportions *as may insure the development of the maximum degree of light which the gas is capable of affording.*

As a general rule, it may be considered that in all burners, whether well or ill made, the greatest quantity of light, *in proportion to the gas expended*, will always be obtained when the flame has been raised as high as it will go without smoking. In proof of this, the following experiment may be made: In any situation where there are three or four burners of the same size, and with similar chimney-glasses, and receiving their gas through a meter (by which the expenditure may be measured), if one of these burners have its flame elevated as high as it can be made to burn without smoking, and if its expenditure per hour be accurately noted on the meter; if the other two or three burners be then lighted, and their flames be so regulated that their united lighting power shall be just equal to the large flame of the first burner, it will then be found, on noting the expenditure, that it is much greater than in the case of the equal light from the single burner, and that the first burner, which gives light equal to two others, consumes but two-thirds of the gas which they do; or, if it be compared with three others giving together an equal degree of light, its consumption will be little more than half of theirs. It follows from this, that when a certain degree of light is required, such a burner should be employed as *is capable of giving this light and no more*, and that it is bad economy to use a more powerful burner with a flame of less than its due height. This rule holds good with any number of burners, and is equally true whether they be well or ill made.

The same rule will apply to the individual jets of an argand burner, as holds in regard to their united effect, and if, in any burner, the jets be of unequal heights, in consequence of bad drilling of the apertures, or neglect of keeping them free of dirt, the consequence will be, that

when the flame is raised until the jet from the widest hole reaches the most advantageous height, those from the obstructed holes will be consuming the gas at a disadvantage, which will be greater or less according to circumstances, but will always be of greater amount than is generally supposed.

The experiments made by Drs. Turner and Christison serve to show, that much smaller chimneys than those usually employed, are required to burn the gas to the best advantage. Unfortunately, however, the dimensions most favorable to economy in one respect, are beyond the limits of economy in another; and when the glasses are made small enough in diameter to obtain the maximum of illuminating effect, they are liable to be softened by the heat; or to be cracked, *if not accurately centered.* A compromise between the two evils must therefore be made, and if this be judiciously done, *a great improvement on the usual routine practice may be effected, a more beautiful and steady light be obtained at a less cost, and our domestic comfort be increased, by the diminution of the heat and effluvia of the gas.*

For practical purposes, therefore, the following directions may be observed:

Whatever diameter is given to the burner, the glass chimney should not exceed it by more than half an inch at the utmost. If the burner be less than three-fourths of an inch in diameter, the chimney-glass should not exceed $1\frac{1}{8}$ inch in internal diameter. In any case, its height should be no more than four inches above the mouth of the burner from which the jets spring.

The smallness of the interval which is in this way allowed between the flame and the glass, renders it necessary that the workmanship of the supporting gallery be accurate, *in order that the chimney may be held perpendicular, and truly concentric with the flame.* Gas-fitters rarely give sufficient attention to this important point, and a large share of the expense from broken glasses is owing to defects in this particular.

In the ordinary mountings, the gallery is put on the burner, which it seldom fits accurately, the glass likewise rarely fits tight into the socket of the gallery; and from these two causes, it is often so much off the centre, or so far from being upright, that the flame cannot be raised to a proper height without risk of breaking it. This risk may be greatly diminished by a little change in the disposition of the burner and gallery. Instead of hanging the gallery on the burner, it should be placed beneath it, and fixed by screwing down the burner on it. In this case, it is necessary to give the gallery an increased diameter, as the air, both for the inside and the outside of the flame, must enter through its ribs. The burners should also be made conical instead of cylindrical; but this is not so important as drilling them with numerous holes—at least double the number usually allowed, as the closer they are the better, the expenditure being regulated by the stop-cock, and not by the number of holes.

In making the galleries, great attention should be paid to having the rim and seat for the glass truly concentric with the hole through which the nozzle-screw, on which the burner is fixed, passes; the workmen should have a solid wooden chuck of the size of the bells of the chimney-glasses, and should chuck the galleries on it, in order to drill the aper-

ture through which the nozzle-screw is to pass. The outside and inside faces of this hole should at the same time be turned true, as, if this be done with the proper care, the glass, the burner, and the gallery, will all be true to the same axis, when they are put together and screwed up. The hole through the gallery should not be tapped, as the burner is sufficient fixture for it when screwed down over it. If this part of the work be well executed, even an indifferently made burner will perform well; and if it be ill done, the best burner will appear defective, and be liable to break the glasses.

The arrangement of burner and gallery here recommended, is not incompatible with the use of plain cylindric glasses, but it will be found better to use what is sometimes called the French-shaped chimneys; that is, those which are used with the common argand oil-lamps. The wideness of their mouths gives them a firm seat in the gallery; and if the length of the bell, or wide portion of the glass, be such that the neck or choke shall be on the level of the lip of the burner, and the upper part of the glass be four inches to four inches and a half long, then a favorable result will be obtained. It is expedient to obscure the lower part or bell of the glass, as the burner is thereby concealed, and the flame appears to rise out of a thick wax candle. No moon-shades should ever be used, as, besides intercepting a considerable portion of the light, they prevent the consumers from observing whether the burners and glasses be in good order, and performing properly.

It is pretty generally imagined that the smoking of ceilings is occasioned by impurity in the gas; whereas, in this case there is no connection between the deposition of soot and the quality of the gas. The evil arises either from the flame being raised so high that some of its forked points give out smoke, or more frequently from a careless mode of lighting. If, when lighting lamps, the stop-cock be opened suddenly, and a burst of gas be permitted to escape *before* the match be applied to light it, then a strong puff follows the lighting of each burner, and a cloud of black smoke rises to the ceiling. This, in many houses and shops, is repeated daily, and the inevitable consequence is a blackened ceiling. In some well-regulated houses, the glasses are taken off and wiped every day, and before they are put on again, *the match is applied to the lip of the burner, and the stop-cock cautiously opened, so that no more gas escapes than is sufficient to make a ring of blue flame*, the glasses being then put on quite straight, the stop-cocks are gently turned, until the flames stand at three inches height. When this is done, few chimney-glasses will be broken, and the ceilings will not be blackened for years.

Gas-fitters and lamp-makers generally put the stop-cocks in situations where it is difficult to get at them, and they make their heads so small, that, if they be in the least degree stiff, it is not easy to turn them gradually; hence, when a little force is applied, they move by starts, and the flame is sometimes raised too high, or, instead of being a little lowered, is altogether extinguished. The remedy for this inconvenience is, to make the cocks easily accessible to a person standing on the floor, and to make their levers so long that their movements may be easily graduated. The cocks and levers may easily be designed so as to form part of the ornamental work of the lamps.

The argand burner being the most perfect and economical which can be used, unless where small portions of light are required, it is unnecessary to say anything of the bat-wings and other fancy burners, especially as the only precaution to be taken with them, is to take care not to raise them so high as to smoke, and never to use two or more low flames, when the same degree of light can be got from one flame burning at its most effective height.

A mode of supplying argand burners with a current of heated air has been lately proposed in Paris, and much praised in London. This is effected by having an outer glass of a diameter a little larger than the inner one. This outer glass reaches farther down than the bottom of the burner, and is closed below by a metal plate; the air for the supply of the flame is made to pass down between the outer and inner glasses, where it gets heated; it then enters the inner glass and the centre aperture of the burner, and passing upwards, supports the combustion of the gas in the usual way. There is no doubt that, by this arrangement, a considerable improvement may be made in cases where ill-made burners, with wide and tall chimney-glasses, are employed; but if the experiment be tried with burners and glasses proportioned in the way recommended above, it will be found that no advantage is gained, and that the maximum effect has been attained by a simpler apparatus.

Before quitting the subject of burners, it may be right to advert to a frequent cause of disappointment in their performance. The perfection of an argand burner is, *that the flame arising from it should appear in a continuous cylindric sheet, with a smooth upper edge, and without forking points*. This is sometimes very difficult of attainment, however carefully the jet-holes may be guaged by the pricker. There are two causes for this irregularity: one is, that, if the drill which is used be blunt, a little blaze is pushed aside by it, when it is forced through the plate in which the jet-holes are pierced; this blaze adheres to the edges of the hole, and interferes with the passage of the gas, and being unequal in its effects, renders the flame forked. The other cause is, that the inside of the burner is seldom turned true, and that the shoulder in which the pierced disk rests is not of equal width all round, and sometimes may be so thick in some places that the drill when it gets through the disk, strikes against the shoulder; this likewise interferes with the issue of the gas. To avoid these causes of irregularity, the following precautions are essential: When the seat for the disk is turned out, the inside space between the inner and outer walls of the burner should be turned true for a quarter of an inch inwards, and no more shoulder should be left than just enough to support the disk in its place. The disk should then be put into its seat, but not finally fixed. The requisite number of holes should then be drilled in it, and slightly counter-sunk to take off the barb. The disk should then be reversed, (that is to say, the counter-sunk face should be put inwards) and finally fixed in its place. The blaze which may have been pushed through with the drill will now be on the outside, and may be easily removed by the file, or by a slight counter-sinking, which is the preferable manner, as the smooth-edged holes will keep longer clean than those with a sharp arras, the application of an old tooth-brush being sufficient to keep them in good order.

The above observations apply chiefly to the illumination of the interiors of buildings, and it may be proper to notice the circumstances which require to be attended to in lights which, being placed externally, are in some degree exposed to the weather. The most important of these are the street lamps. These may either be arranged at considerable distances, and be fitted with powerful burners, or the intervals between them may be smaller, and only a single jet be allowed for each. Various local considerations must determine this, as well as some other points; but it should be kept in mind, that the best small light is either the single jet of 3½ or 4 inches high, or the fish-tail jet of 3 inches high, and that for more powerful lights *the argand is preferable to all others.* The large bat-wing, so much used in large public lamps, is wasteful, smokes the lantern, and does not give light in proportion to its expenditure.

In most towns, framed square lanterns are used for street lamps, as it is said that globes are apt to be obscured in cold weather by the deposition of the water generated by the combustion of the gas. It is no doubt true, that if proper precautions be not taken, this inconvenience would be felt, and the water which would trickle from the aperture in the bottom of the globe would be liable to freeze in severe weather, and so to close up the access for air, that the lamp would smoke or go out. In all other respects, globes have undeniable advantages over framed lanterns, as they protect the flames better in high winds, and they are kept up at much less expense.

Some years ago I pointed out to the Commissioners of Police of this city, that advantage might be taken of the acknowledged good properties of the globes for lighting the streets, and the alleged defect be obviated by constructing the tin tops with chimneys which should reach down to the points of the flames, and by their current carry off the water while still in a state of vapor, and so prevent it from being condensed on the sides of the globes. This plan was immediately tried; and having been found successful, was adopted in all the lamps erected subsequently. It occasionally happens, that from the jet being deranged, the gas is directed past the tin chimney instead of into it; and if the weather be cold, it is immediately observed that a deposition of water takes place inside the globe, and its sides become dim. The adjustment of the burner restores the proper action, and the globe remains bright. This plan having now stood the test of many years' experience, may safely be recommended for adoption wherever new street-lamps are erected. Edinburgh New Phil. Jour.

STEAM BOILER EXPLOSIONS.

The following is extracted from a lecture upon heat and its effects, delivered before the Truro Institution, by J. Sims, Esq. engineer.

"And here I beg to call your attention to a few brief remarks on steam boiler explosions, which I have been led to make in consequence of the many distressing accidents that have occurred in this county during the last few years, and which I am sorry to say have been lamentably destructive of human life. I more particularly refer to the Cornish engines than any others, because we, in Cornwall, work

with steam which is generally termed high pressure, that is varying from about 10 lbs. per square inch, to 50 lbs. per square inch, and this in proportion to the load of the engine and the opinion of the engineer in point of economy of fuel. In making these remarks I have called to my aid the opinions of some of our most eminent engineers in conjunction with a long and extensive practice of my own, and taking into the account the very great increase of steam engines out of Cornwall, exactly on the plan now in general use in this county, it calls loudly on all who are or may be employed in the construction of the steam engine, more especially in that part of it which is termed the boiler or steam generator, to so modify the thing as to render it safe as possible, and to make use of steam, which would be much more safe in its operation and equally beneficial, so far as regards economy of fuel. The form of boilers now in use in Cornwall, is cylindrical, having a cylindrical tube; the general size is about six feet six inches diameter, with tube varying from about three feet nine inches to four feet diameter; about six feet long of this tube is used as the furnace or fire place, consequently the whole of the fire is surrounded by water. Various opinions have been suggested of the causes of explosions; some attributing them to the igniting of explosive gases generated within the boilers themselves; but I think this opinion is not based upon any satisfactory or valid foundation. Under certain circumstances hydrogen gas may be formed inside a boiler, in consequence of the overheated iron plates decomposing the water of the steam by abstracting and uniting with its oxygen; but the circumstances under which this process may go on, I conceive must be exceedingly rare, and the effect of very trifling amount. If it were possible for the gas to be formed in any considerable quantity, the circumstance must be immediately known by the very perceptible effect it would have upon the working of the engine; or how, I would ask, is the gas to become of greater pressure than the steam, even if the engine should not be at work, when there is the same aperture for its escape? There is one fact of so strong and irrefragable a character that in my opinion it decides the fate of this hypothesis, and clearly proves that steam boiler accidents cannot be attributed to the explosion of gases. The fact alluded to is this, that an explosion or a collapse in the numerous class of low pressure boilers is a thing never heard of, while it is too frequent among high pressure boilers; although it is certain that the low pressure boilers are quite as likely to form the gases as the latter. The plates of the fire places and flues of low pressure boilers are quite as likely to form the gases as the plates and flues of high pressure boilers, because the low pressure boilers are probably quite as much exposed to the mischance of becoming red hot, and from their great capacity, are likely to hold the gases in greater abundance; but notwithstanding, in low pressure boilers no explosions do take place, no fatal accidents, no loss of life. I think in doing away with the opinion respecting gases, the causes of steam boiler explosions may be classed as follows. 1st. In the improper form of the boiler, being insufficient to bear the pressure of steam which the engineer may think proper to use. 2d. In the neglect of the engine man allowing the water to get below the back of the tube, which is the back of the fire-place, thereby allowing that part

to be heated to a very high temperature, and of course rendering the iron weak and less capable of bearing the pressure of steam, which is in proportion to that temperature. 3d. By being weakened by wear, and not proper attention paid to lessen the pressure of steam in proportion to that wear. But I fear that the greater number have exploded by means of using steam of an unnecessary pressure; and in order to render this fact as clear as possible, I beg to remark here that the Cornish engineers in carrying out the great principle of working steam expansively, and which principle has been the means of causing the Cornish engines to exceed all others in point of economy of fuel, I say they have (myself amongst them) lost sight of one important feature in this principle of expansion, which is that of omitting to have the apertures for the admission of steam from the boilers to the steam cylinder of a proper size, or of a size large enough for the proper admission of the steam in proportion to the load of engine and pressure of steam required. The consequence is that it is found necessary to have steam in the boiler of a much higher pressure than would be necessary, provided the aperture from the boilers to the cylinder had been a proper size—and this is in a ratio proportionate to the load of engine and rate of expansion. This important feature in the steam engine has been so far neglected that I have known a seven inch aperture *only* used for the admission of steam on a seventy inch piston. The area of the seventy inch piston being upwards of one hundred times as much as the area of aperture or valve for the admission of steam, it becomes a natural inference that so small an aperture could not possibly supply one third of such large cylinder in about a second. I mention one third of the cylinder, because that is about the average distance which the pistons do descend before the steam from the boiler is cut off, the remaining part of the stroke being performed by the expansibility of the steam which entered the cylinder for that one third of stroke. The consequence of having such small apertures is, that it is found necessary to have steam in the boilers of a pressure very much above what would be necessary, provided the steam pipes and steam valve had been of a proper size; and this inconvenience becoming more as the load of engine increases, I fear that explosions of the worst character have taken place in consequence. I have reason to believe that the present cylindrical boilers in use in this county are as safe with thirty pounds per inch pressure, as the old low pressure boilers were for the steam they used; and in all the steam engines which I have the management of, I have made it a rule for some years that I would use steam of no higher pressure; since which, I have had no explosion nor anything in the shape of a serious accident. The average duty of the engines has been above what it was before, and the boilers will last a considerable time longer. Respecting the lamentable explosion which took place at the Consolidated Mines, a short time back, the distressing effects of which must still be fresh in your memories, it was stated that it must have been caused by the neglect of the engine man in allowing the water to get below the back of the tube; and the reason assigned for this was, because that boiler was said to be the strongest, and must have been weakened by heat to cause it to explode; and the other two boilers, which it was said were not so strong, remained uninjured.

The strength of cylindrical boiler tubes to resist an external pressure, exerted on its outward surface, is a very different thing from the strength of the same tube to resist an internal pressure; because when the force is exerted on the inside of the tube, and tending to burst or rend it asunder, the relative strength or power of the tube is very easily estimated. But in the other case, when the pressure is external, the strength of the tube to resist such pressure will depend upon very different principles. The tube in this case depends for its strength on the perfect state of the circle of which it is formed, and the thickness of the plates; and it must be clear that steam of from forty to fifty pounds per square inch, acting on an arch of about four feet span, made of half plate, will cause that arch which is most imperfect, to collapse first; and that if a tube has got any defect as to form, so as to render it a more imperfect arch than the next boiler alongside of it, it will yield to the pressure before the other, although in appearance it was the strongest boiler; and further, the one with the imperfection is weakest, in proportion to the amount of the imperfection, and the liability to explode becomes more, in proportion to the increased temperature and pressure of steam, thereby rendering the plate more weak through heat, consequently less capable of resisting the increased pressure; and really if we look at an arch of four feet span only, made of iron plate of half an inch thick, considerably weakened by heat, and with a force of fifty pounds per square inch acting upon it, and unavoidably imperfect as to form, it becomes a matter of very little surprise to find they will collapse. Under all these circumstances it appears to be too much to say of boilers, having just the same appearance, which is the strongest. If it were possible to form a tube of a boiler to a perfect circle, which would be the true figure of greatest resistance, there is little chance of its remaining so; the expansion and contraction, together with the increased pressure against the bottom of the tube in proportion to the height of water in the boiler, which gives upwards of three pounds per inch pressure more there than in the top of the tube, has a strong tendency to injure its circular form. The imperfect form of tubes to support an internal pressure is not of so much consequence, because the pressure tends to improve the form; but with an external pressure the contrary effect takes place. The extraordinary effects which often take place by means of boiler explosions, I consider are in proportion to the quantity of fire in the furnace or tube, and quantity of water in the boiler, and by means of the tube collapsing and the water bursting immediately into the fire, generate steam of an incalculable pressure, the sad effects of which I need not mention here. Various plans have been suggested in order to prevent explosions; some by giving a signal to the engine man when the water has become too low in the boiler; but a question arises whether or not the occasional defective state of these things, together with the reliance or dependence the engine man would place in them, would not be the cause of more explosions in a given time than there has been without them. The common guage cocks are sure indicators of the state of the water in the boiler; and if the engine man neglects these things I would not place much reliance on the safety of any other thing. Lead plugs have been applied immediately over the fire, the intention of which has been that if the engine man

should allow the water to get below the back of the fire place, the lead would melt, and thereby give him notice of danger; but this can be of little or no use, because it requires a temperature of 612° to melt the lead, which temperature will cause the iron to become so weak that steam of ordinary pressure will at least injure the boilers before it has attained the above heat. The present cylindrical boilers now in use in this county and in many other parts, are in my opinion the most economical generators of steam and the most safe that have been hitherto adopted; but it must be borne in mind that no boiler of whatever form can be safe without proper attention being paid by the engine man as to the water guage, and by the engineers as to the pressure of steam used in proportion to the strength of boilers. And I would beg strongly to recommend, that with the strength of boilers at present in use in this county, steam of more than thirty-five pounds per square inch should not be used; and that proper apertures for the admission of steam on the piston, in proportion or suitable to that pressure should in all cases be used. I am fully satisfied that if this is properly attended to, we shall have no more violent explosions."

NATURAL HISTORY.

A few days ago, a log of St. John's yellow pine timber, cut up in the Greenock patent saw-mill, was found to contain a hive of bees, in a most perfect state of preservation. The log was a root-cut, 35 feet in length, and 26 inches square. It was about 140 years of age, as indicated by the annular fibres of the wood. The age of the tree at the period when the bees seem to have taken up their abode in it, must have been from thirty to forty years, as all the timber beyond that age was perfectly sound and without perforation. The insects were found in drouses of various sizes, all the way up from the bottom of the tree to near the upper end, and each drouse was connected with the other by a small aperture or passage, by which a connection was established between all the compartments of the hive. Bees in all stages of growth, and without any wings, were found in it, and the full-grown bees, in a state of perfect preservation, presented an appearance exactly similar to that of our own honey-bee after being destroyed by smoke. One of the cells filled with the bee still remains at the mill, for the inspection of the curious in natural history. Glasgow Saturday Post.

This is not a solitary instance of bees being pent up in wood. Major Long relates a similar circumstance in Western America. Dr. White, formerly of Columbia College, found a bee embedded in the top of an old mahogany table, where it had undoubtedly been secreted during the growth of the tree.

Carnivorous Plants.—Of all the instances of sensibility in plants, the most remarkable is that of the Venus's Fly-trap. It has a large, dilated foot-stalk, and leaf formed of two lobes fixed by a middle rib, with

some thorny processes or protuberances, an arrangement to give it irritability. Nature provides a honey-like secretion, which attracts the flies and insects to feed upon, and by stepping on them the leaves close, and the insect is entrapped. Mr. Knight first ascertained that this plant could be fed on filaments of raw beef; but the general complaint is, that it will not live long enough in this country, from the want of a supply of its proper food. The lecturer was the first to discover that the sensibility resided in the thorns, and not in the middle rib, where it was formerly supposed to belong. After flies or any other insects are entrapped, the leaves remain closed several days, when the insect may be seen struggling within. The process will go on till both lobes of the leaf are collapsed and straight, and the teeth locked, until, at last, it will reöpen, when the insect will be seen crushed, every particle of fluid being absorbed, so that the fly may be blown out at almost the first breath of wind. There is another plant allied to it in geographical distribution, which, when kept in a green-house, entraps beetles, flies, and other insects. At the bottom of the flower is a saccharine liquid, to which the insect goes, but cannot return, as he is arrested by what are not inaptly compared to files of bayonets. The lecturer made a series of experiments on these plants, which had been in his possession for upwards of twelve years, by feeding them with filaments of beef and mutton, and they were at last destroyed merely by accident. Another plant, a native of our own country, the droseua roturdifolia, or sundew of our marshes, possesses apparatus of an analogous organic character, bearing a viscid fluid, and a multitude of hairs, which have the effect of catching insects whereon to feed the plant. Professor Johnson's Lecture.

The common milk-weed and the saracenia have similar properties; but we are unwilling to carry our politeness so far as to believe the whole of the worthy professor's theory. There can be no doubt that the aqueous portions of the animal will be abstracted by the plant; but we also think that a piece of wet sponge would have been entrapped as readily as the beef, with full as great advantages to the plant.

Doryanthes Excelsa is one of the most conspicuous of the innumerable floral beauties which we owe even to the prolific flora of New South Wales. The stem rises eighteen or twenty feet from the centre of the plant, which is not unlike a large yucca or pine plant, and at the top there are several branches or stems, upon each of which expand a number of splendid crimson and pink flowers, somewhat like those of a canum, but infinitely richer in color. The specimen now blooming at Worton Lodge, Isleworth, is the first that has flowered in this country. Glasgow Post.

It is a well known fact in natural history, that in large lakes and rivers, where swans abound, the parent birds, at the age of fifteen or eighteen months, drive off the large cygnets, and compel them to seek for new abodes. A beautiful pair of such youthful emigrants lately

established themselves on the splendid lake at Stamford Court, in Worcestershire, the seat of Sir Thomas Winnington, Bart. These birds appear about two years old, still retaining a portion of yellow down on the neck and body, and are so reconciled to the new situation they have chosen, that they approach the margin of the lake with much confidence and speed, on a signal from the gardener, who has received orders to feed and attend to them. Glasgow Post.

Of every other tree connected with rural economy, perhaps the linden is the most valuable. In Russia, its properties are so well understood that it is seen growing in every hamlet and village possessing a soil capable of nourishing it. The wood is not only manufactured into furniture, but into a variety of domestic utensils. Cords and matting are made from its inner rind, while its aromatic blossoms not only perfume the air and feed the bees, but make an agreeable ptisan for the invalid. The Circassians feed their bees on the blossoms, to produce the fine, green honey, aromatic in odor and delicious in flavor, esteemed so great a delicacy by the rich gourmands of Constantinople and Teheran. The young and tender sprigs, with their foliage, serve to mix with the fodder during the depth of winter, being highly palatable to the cattle. It is an ornamental tree, and may be seen adorning nearly every public garden and promenade in Germany. Glasgow Saturday Post.

The effects of Food on the Form and Character of Quadrupeds.—Food influences all the external characters of quadrupeds. Without adverting to the different appearance of an ill-fed beast, and one which has an abundant supply, we may remark, that the form of the young animal that suffers a deprivation either in the quantity or quality of its food, never becomes perfectly developed, either in its bulk or proportions. The integuments of such an one never present the gloss of health, neither is the constitution at large often free from disease: internal congestions take place, and the mesenteric glands frequently become scirrhous: on the contrary, in proportion as the supply within prudent limits is liberal, so is the growth extended, and the form reaches to the standard of the parent. It often also exceeds the parent stock from the excess of nutritive stimulus applied; and thus horses, oxen, and sheep, brought up in low, marshy lands, where the herbage is luxuriant, obtain a monstrous size. Horses, in particular, when bred and pastured in the rich flatlands of Lincolnshire, become expanded in bulk; and it is from such sources that our carriage and heavy troop horses are supplied. To what a degree of monstrosity may not our bacon-hogs be fed! and our prize oxen exhibit the extraordinary powers of food, when forced on an animal, by increasing the supply and restraining the expenditure. It is from our artificial mode of feeding cattle that our markets are now furnished with veal all the year round, and lamb is common some months before it appeared on the tables of our forefathers. Stimulating food produces the sexual appetite at almost any time the owner may desire; and as man by domestication has provided artificial sustenance and housing for the young animals thus unseasonably produced, nature does not interfere in this breach of her ordinary laws.

Encyclopedia of Rural Sports.

DESCRIPTION OF PATENTS

Granted from April 24th to May 26th, 1840.

Improvement in machinery for the manufacture of Stuffs in which the Fibres of various materials are united with adhesive Mixtures. By Thomas R. Williams, Cit. U. S. now in London, England. Dated April 24th, 1840.

Claim.—What I do claim as my invention, and desire to secure by letters patent, is the so combining and arranging the machinery employed substantially in the manner herein set forth, as that the processes of forming the bat, and of saturating the same with the different compounds, shall be simultaneously and consecutively effected, so as to form sheets or lengths of fibrous materials applicable to various purposes.

Improvement in the Machine for crushing hard Substances. By James Rowe, Athens, Alabama. April 24th.

Claim.—That which I claim as my invention, and desire to secure by letters patent, is:—1. The mode herein described of preventing the grinding-wheels from slipping, by means of the cog-gearing or by cross projections and indentations in the bottom of the valley, together with cuts or notches on the tread of the grinding wheels.—2. The method of applying the weight of the centre revolving shaft, or any additional weight which may be applied thereto, to the grinding or crushing wheels, by making the shaft bear upon the vibrating beam to which the wheels are attached, as herein described.

Improvement in the mode of constructing the Power Loom, so as to adapt it to the weaving of Figured Counterpanes and other articles. By Erastus B. Bigelow, Lancaster, Mass. April 24th.

Claim.—What I claim as constituting my invention, and desire to secure by letters patent, is:—1. The manner in which the picker staves are operated upon by a single treadle so as to act simultaneously, whereby two or more shuttles may be thrown successively from the same shuttle-box, if required, the apparatus therefor being constructed substantially as set forth.—2. I claim the raising of the shuttle-boxes by the action of a spring or springs, weight or weights, and the allowing them to descend by their own gravity, when the tension of the spring or force of the weight is taken off, the same being effected in the manner described, or in any other analogous thereto.—3. I claim the relieving of the shuttle from the picker, by means of an apparatus constructed and operating as herein set forth; that is to say, by the combined action of the levers U, the pieces V, and the rods A, connected and operating substantially as described.

Improvement in the manner of constructing Bedsteads, and cording the same. By Martin Engel, Easton, Pa. April 24th.

Claim.—What I claim as constituting my invention, and which I desire to secure by letters patent, is the manner of connecting the posts and rails together, by causing the pins on the ends of the tenons of the side-rails to enter holes prepared to receive them in the tenons of the head-rails, as herein set forth.

I also claim the manner in which I have combined and connected the windlass, the roller E and F, and the cord upon which they operate, for the purpose of tightening the same, and of straining the side-rails and posts together; the whole operating substantially in the manner described.

Improvement in metallic Heddles for Looms. By CHARLES STRONG, Hartford, Vt. April 24th, antedated Jan. 21st, 1840.

CLAIM.—I do not claim to have invented the metallic heddle, but I claim to have made improvements upon it. What I claim is :—1. That I have invented the method of constructing the eyelet holes in the common and listing heddles, as above specified.—2. I claim to have invented the method of arranging the metallic heddles in two rows instead of one, by which arrangement higher sleyed cloths may be woven by the metallic heddles than without that arrangement, as above specified and described.

Improvement in Machinery for making Rivets. By OLIVER EDES and ANDREW HOLMES, Braintree, Mass. April 24th.

CLAIM.—1. We claim a lever or beam H I J, (to which the cutter *i k* is attached) operated on or pressed downwards by the cam G on a horizontal shaft B B, in combination with the steel block *f g*, and standard or guage U, the whole operating to cut off and regulate the length of the piece of wire to be formed into a rivet.—2. We claim the combination of the cutter *i k*, and arm V, for pinching or nipping the piece of wire separated by the cutters, and conveying it downwards (by descent of the cutter *i k*) to the aperture *q r*, to be headed by the heading machinery; and we claim that combination and arrangement of the parts for withdrawing the arm V from under the head of the rivet in the aperture *q r ;* the said combination and arrangement consisting of the bent lever X Y Z, the standard *l m*, spring *o p*, connected to the shelf or arm V, and operated by a stud or projection W from the heading carriage, substantially in manner above described.—3. We claim the combination of machinery, (consisting of an upright lever M, bar *a z*, lever *w x y*, and piston *u v*, operated by a crank *k* on the main shaft B B and connecting rod L,) for forcing or pushing out the rivet from the aperture *q r*, after the heading machinery has performed its office.

Moveable Loading Muzzle for Rifles. By ALVAN CLARK, Cambridge, Mass. April 24th.

CLAIM.—I claim as my invention, and ask a patent for the loading muzzle for the rifle above described, constructed, adapted, fitted, and applied as above described.

Improvement in the machine for braiding Manilla Hemp and other Fibrous Substances. By DANIEL, JESSE, and ELISHA FITZGERALD, New-York. April 24th.

CLAIM.—What we claim as our invention, and desire to secure by letters patent, is :—1. The combination of the pressing-rollers M and N, with spool-guides Q, and eye-plate, as herein described.—2. The employment of the guide Q, Pl. 1, in the manner and for the purposes described.

Improvement in Corn Shellers. By PORTER A. GLADWIN, Chester, Middlesex County, Connecticut. April 24.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the forming of the concave with a number of shelling rollers arranged in the manner herein set forth. Also, the arranging of the spring beds in the carrying cylinder instead of the concave as herein described.

Improved method of constructing the Boilers of Steam Engines. By JOHN PENNIMAN, Baltimore, Maryland. April 24.

CLAIM.—What I claim therein as my invention, and desire to secure by letters patent, is the placing a series of circulating tubes on the front plate of the boiler, in such a manner as that they shall at their lower ends communicate with the water in the lower part of the boiler, and at their upper ends with the water in said boiler a little below the water line, whilst they are along their whole length, exposed to their direct action of the heat in the fire box, in the manner and for the purpose above set forth.

Improvement in Smut Machines. By JACOB RUSELL, Jenner, Somerset County, Pa. April 24.

CLAIM.—What I do claim, is the arranging them in a case formed with a double concave, so that each series of fans or beaters shall revolve in a separate concave, as herein described.

Improvement in the duplex escapement in Watches. By C. E. JACOB DES COMBES, Baltimore, Md. April 30.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, consists in constructing the escapement wheel R, with bifurcated teeth, so that in operating on the rouleau placed on the pivot of the balance wheel a greater number of vibrations may be produced than in ordinary duplex watches; and in making it without the pinion hitherto placed on its axis, (which in my arrangement is transferred to the wheel G,) by means of which improved construction of the escapement wheel, its pressure on the rouleau is lessened, as above described. I also claim the combining therewith the wheel G, with its pinion G,′ for the purpose, and in the manner set forth.

In the second part I claim the manner of combining and arranging the double hands, the barrel D, the ratchet spring *r*, and the ratchet wheel, to be operated upon by means of the ring and catch, in the manner and for the purpose described.

Improvement in the construction of drums for heating apartments. By WILLIAM FRAZIER, Brooklyn, New-York. April 30.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the partitions K, and the pipes I, combined in the drum B, as above described.

Improvement in the apparatus for the treatment of Club Feet. By JOHN B. BROWN, Boston, Suffolk County, Mass. April 30.

CLAIM.—1st. I claim constructing the foot board A, fig. 1, of two parts, B and C, and connecting the same by a radial bar C, turning on a centre pin *e*, figs. 1 and 2, so that by means of a toothed sector *d*, figs.

1 and 2, on said radial bar *c*, and an endless screw *f*, working in the teeth of said sector. The anterior part C, and heel B, on application of a turning key on the shank *g* of the endless screw *f*, may be set in angular positions with each other, so as to adapt the same to the angle of deformity of the "club foot," and afterwards used to correct the said deformity in manner as herein before described.

2d. I claim connecting the anterior parts and heels by the yokes *a b*, *c d*, attached to ears *e*, *f*, *g*, *h*, fig. 3, and *e'*, *g'*, fig. 1, projecting therefrom; the former of said yokes being somewhat longer than the latter, thereby turning the feet outwards until the divided tendons are united, and the bones acquire the relative and normal position.

Improvement in the mode of feeding and pressing the Straw in Straw-Cutting Machines. By ISRAEL W. GROFF, Lampeter, Lancaster county, Pa. April 30th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the combination of the bearer and rack-wheel, constructed and operating as herein set forth; that is, worked by the dogs in such a manner as to change the pressure alternately from the bearer to the feeder, which effect is produced by the manner in which the dogs are worked by the cams, the feeding by this operation being made thicker or thinner, and the stuff cut short or long, at pleasure.

Instrument for adjusting the Grinding Surface of Artificial Teeth. By JAMES CAMERON, Philadelphia. April 30th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the combination of the plates A and B, with the stand C, the whole being constructed and operating substantially as described or set forth. I claim also, in combination with the foregoing arrangement, the rod O, and shaft M, for supporting the lower plate when in use. Lastly, I claim the mode of regulating the motion of the lower plate by means of the combined operation of the hinge I, screw J, and screw K, attached to the horizontal rod F, as herein set forth.

Improvement in the Machine for picking and opening Wool, Cotton, and other fibrous substances. By GEORGE C. KELLOGG and PHINEAS GILLETT, New Hartford, Litchfield county, Conn. April 30, 1840, antedated Oct. 30, 1839.

CLAIM.—What we claim as our invention, and desire to secure by letters patent, is the combination of the feeder and shell, and also their combination with the picker and cylinder as described.

We also claim the method of holding and setting the teeth in the lags, by means of the screw-staples or bolts as described.

Improvement in the process of Tanning. By R. T. DOWNING and GEO. D. SMITH, Philadelphia. April 30th.

CLAIM.—What we claim as our invention or discovery, is an improvement in the art or process of tanning, by cleansing the hides whilst suspended in bark or other liquor containing the tannin principle, by means of a brush with a long handle, made and used as above set forth, in order to prevent the collection of any sediment, dirt or impurity upon the surface or grain of the leather, and thus to allow the liquor to act,

producing gradually, from commencement of the process, the desirable color or bloom, and giving the tannin a free access through the pores to unite with the gelatine of the hide.

Improvement in Seed-Planters. By LORENZO and SAMUEL H. BACHELDER, Hampsted, N. H. and Haverhill, Mass. April 30th.

CLAIM.—We claim the combination of the coulter C, with the ploughshare D D, chisel-shaped projection or nose E, and crop-sill *d d*; said combination being substantially in the manner and for the several purposes herein above described. We also claim the combination of the dropping-tube or conducting-pipe *a a* with the above specified parts, for securing the effects herein above specified.

Improvement in Fire-Places to prevent their Smoking. By HOMER ROBERTS, Delhi, Delaware county, N. Y. April 30th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, consists in the before described mode of arranging the cast and wrought iron straight and curved plates in the chimney, forming curved flues, for curing and preventing chimneys from smoking, and forming openings for the convenience of removing the soot, and for obtaining an easy admission into the chimney from the fire-place, as herein set forth.

Improvement in the machine for extracting Stumps. By FREDERICK A. STEWART, of Catharine, New-York. April 30.

What I claim as my invention, and which I desire to secure by letters patent, is the construction of the lever as before described, so that the angle formed by the inclination of the lever, and the chain attached to the stump can be decreased at pleasure, independent of the size of the stump, which is not the case with "Foster's."

Improvement in the machine for preparing and spinning Hemp, &c. By MOSES DAY, Roxbury, Mass. April 30.

1st. I claim the combination of the revolving drums and several rows of teeth with the machinery within said drums for operating the several series of teeth or metallic points; the whole of the above specified machinery being constructed and operating substantially in the manner and on the principles herein above set forth.

2. I claim the regulator *m*, constructed substantially as herein before described and also the combination of the same with the several different series of teeth formed as described, (those near the sides of the drums being shorter than those near the centre of the same,) which arrangement in conjunction with the peculiar shape of the regulator forms the roving from which the thread or yarn is to be made.

3. I claim stopping the motion of the preparative part of the machinery by means of the regulator *m*, in combination with the rod q^2, shaft r^3, the bent lever t^3 on the said shaft, bent lever u^3, and clutch y^3 on the shaft P P, as herein described.

4. I claim the employment of a single threaded screw g^2 on the spindle, and its combinations with the fork e^2, (attached to the side of the series of pulleys a^2, n^2,) belt z^1, pulley w^1, and drum y^1, the whole constructed and operating substantially as above described, for the purpose of imparting a reciprocating rectilinear motion to the spindle and bobbin.

Improvement in the mode of stiffening Rocket Staffs. By JOHN W. COCHRAN, New-York. April 30.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the method herein described of stiffening rocket staffs by means of metallic stiffeners in the form of metallic cylindrical tubes, or with a cylindrical metallic tube, having flanches, or with the metallic flanches above, as herein described, or in any other way that shall be substantially the same.

Method of taking Likenesses, by means of a concave reflector, and plates so prepared, as that luminous or other rays will act thereon. By ALEXANDER S. WOLCOTT, New-York. May 8.

CLAIM.—I claim as my invention, and desire to secure by letters patent, the taking of likenesses from life by the aid of a concave reflector, placed so as to receive the rays from the person whose likeness is to be taken, and convey them to a focus on a prepared plate, paper, or other material, placed between the person and the reflector.

Improvements in the construction of the Stop Cock. By JAMES ROBERTSON, New-York. May 8.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is making the valve A fit more firmly in its seat by means of the independent wedge, constructed and operating as above described. 2d. I claim the mode of cleansing the chamber S from any dirt that may accumulate in it, by means of the escape valve H, arranged and operating as above set forth.

Improvements in the construction of the Tailors' Measure. By RICHARD DAME HANSON, Grafton County, New Hampshire.

CLAIM.—What I claim, therefore, as constituting my invention and improvement, is the attaching the additional or extension branch at the end of the ordinary horizontal branch B, of the tailors' measuring square, by means of the hinge H, and combining with the branches the sliding hinges for attaching said branches, as set forth.

Improvement in Metallic Wigs. By F. BOURGUET, New-York. May 8.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the construction of the metallic wig, with an additional transverse piece or spring C′, C, C″, tempered soft and flexible, so that it may be bent to any degree the wearer pleases, and of sufficient thickness to control the elastic spring B′, B, B″, and keep it in the position to which it has been bent.

I also claim in combination with the above, the arch spring A, B, C, D, E, and oblique spring D′, D″, and D, D″, the whole being constructed and operating as herein set forth.

Improvement in Horse Power for driving Machinery. By GEORGE STRENGE and JACOB ROHRER, Lancaster, Pa. May 8.

CLAIM.—What we claim herein as of our invention, and desire to secure by letters patent, is the allowing of a vertical play to the sweeps or levers, by causing springs to act upon their upper and lower sides, in the manner and for the purpose set forth.

Improvement in the Railroad Car Brake, to prevent accidents in descending Inclined Planes on Railroads. By MATTHEW W. KING, New-York. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the compound lever brake, combined and arranged as herein described.

Improved Composition for writing on Glass. By WILLIAM DAVISON, New-York. May 8th.

CLAIM.—What I claim as my invention, and which I desire to secure by letters patent, is the method of preparing the surface of the glass, under which the copy to be imitated is placed and on which the writing is performed, by rubbing it with a cake composed of hard soap and English scouring-sand, as before described.

Improvement in Tub Water-Wheels. By ABIJAH WOODARD, Athol, Worcester county, Mass. May 8th.

CLAIM.—What I claim herein as constituting my invention, and desire to secure by letters patent, is the enlarging of the lower end of the shaft of such a wheel, by surrounding the same with a drum, upon which drum I place two rows of buckets in addition to and in combination with the row of buckets used in the ordinary tub-wheel, the whole being constructed and operating substantially as herein set forth.

Improvement for shaking the Screen or Apron in Threshing-Machines, that carries the Straw from the Threshing Cylinders. By JESSE LINCOLN, Uniontown, Fayette county, Penn. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, consists in the combination of the flat roller with the revolving screen, as before described.

Improvement in the Dredging-Machine, for excavating under Water in Rivers, Docks, &c. By OLIVER ALLEN, Norwich, New London county, Conn. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the manner in which I govern and direct the operation of the excavating bucket F, by the combined operation of the lever E E, and the rope or line I I, arranged and operating substantially in the manner and for the purpose herein set forth.

Improvement in the manner of constructing Winnowing-Machines. By ABEL and ASAHEL LOMAX, Clinton county, Ohio. May 8th.

CLAIM.—The parts of the herein described machine which we claim as our invention, and for which we wish to secure letters patent, are specified as follows:

1. We claim the adapting of one end of the cylinder to the shoe, and this having the air to pass from its end directly into the shoe.

2. We claim the mode of arranging the shoe by which we are enabled to communicate a greater motion to the upper than the lower part of it.

Improvement in the manner of constructing Garden Hoes. By CHARLES S. HOMER, Boston, Mass. May 8th.

CLAIM.—What I claim is the mode herein described of connecting the hoe-plate and shank, by forming the latter with a square head, and riveting it to the outside of the blade, the shank having been passed through it, and passing an iron collar over the shank on the inside of the hoe-plate, in the manner herein described, so as to confine the plate between said collar and the square head on the outside of it; by means of which arrangement I am enabled to give not only greater strength to the blade of the hoe, but to make the instrument more durable than hitherto constructed.

Improvement in the manner of constructing Railroads. By WILLIAM RUSSELL, New-York. May 8th.

CLAIM.—What I claim therein as constituting my invention, and desire to secure by letters patent, is the manner of forming the track or road by the combination of the string-pieces with sloping sides, and the wooden blocks cut from scantling adapted to the said sloping sides, and resting on a foundation of boards or plank, the whole arranged and constructed substantially as set forth.

Improvement in the Life-Preserver. By RALPH BULKLEY, New-York. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the combination of the air-tight tubes with the belt, in the manner and for the purpose described.

Improvement in the Life-Preserver. By HENRY B. BOURNE, New-York. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the method of adapting the common berth mattress to a life and property preserver, by making a water-tight chamber, provided with leggins between the two halves of the mattress, for the purpose and in the manner described. I also claim the making a portion of each half of the mattress buoyant, for the purpose and in the manner described.

Improved self-acting Sparger, for distributing Water upon Malt in the Mash-Tub. By H. J. BROOKE and F. B. LONGMIRE, Philadelphia. May 8th.

CLAIM.—We claim as our invention, and desire to secure by letters patent, the manner in which we have applied this principle, by combining a reäcting apparatus with the mashing-tub; the whole being constructed in the manner and for the purpose herein described and set forth.

Improvement in the method of stopping accidental breaches in Fire-Hose. By RALPH BULKLEY. May 8th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the mode of repairing lateral breaches in hose by

means of screws, as herein set forth. Also, of repairing larger breaches in the same, by means of metallic plates and inflexible tubes inserted in hose, constructed and secured in the manner herein described.

Improvement in the construction of Fire Escapes. By WILLIAM P. WITHEY, Hartford, Ct. May 12.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the bringing of the railed platform to the top of the ladder, and rendering it capable of being adjusted to a horizontal position, whatever may be the inclination of the ladder, by means of the toothed segments *o*, *o*, the whole being constructed and operating substantially in the manner herein set forth.

Improvement in Hulling Machines. By JAMES MCGREGOR, Saratoga, New-York. May 12.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, in the above described machine, is the manner in which I have combined and arranged the revolving disk and the hollow drum or cylinder, with flights or projecting pieces thereon, affixed in such a way as to carry the grain or seed, under considerable pressure, towards the periphery on the upper side, and towards the centre on the under side of the revolving disk. I also claim in combination therewith, the valve bearing against the delivery opening, for the purpose of increasing the pressure to any desired extent.

Improvement in the construction of the Franklin Cooking Stove, and causing the jambs to rise or fall through the apron. By JOEL HOUGHTON OGDEN, New-York. May 12.

CLAIM.—What I claim as my invention, and which I desire to secure by letters patent, is making the jambs of the stove or Franklin to lower through the apron of the same, so as to bring the boiler holes that are above the jambs immediately over the fire, the whole being constructed and operating as herein set forth.

Improvement in the construction of machinery for Hulling Rice, &c. By DANIEL TOMLINSON, Brookfield, Conn.—May 12.

CLAIM.—What I claim as my invention, and wish to secure by letters patent, is the before described mode of producing any desirable amount of pressure on the materials to be hulled or cleaned, and continuing the same through the whole length of the cylinder, by the combined operation of the oblique teeth, the round teeth, and the sliding gate or issue, effected continually during the operation of the machine.

Improvement in Bedstead Fastenings. By WILLIAM H. SABIN, New Milford, Pa. May 12.

CLAIM.—What I do claim is my improved mode of forming and affixing them by a cylindrical ferule or segment to the posts, and by a ferule to the rails, the end of which ferule is hollowed to adapt it to the post, the whole being combined and arranged as above described.

Improvement in the Sofa which can be adapted to invalids. By MARTIN ENGEL, Easton, Pa. May 12.

CLAIM.—What I do claim as constituting my invention, and desire to secure by letters patent, is the peculiar and novel manner in which these objects are effected by me, so as to render it more manageable and convenient than those heretofore constructed.

That is to say, I claim the manner in which I have combined the windlass with the raising frame and the jointed arm in the head part A, not intending to claim either of those parts separately but only in their entire combination as herein set forth; I in like manner, claim the combination of the respective parts which constitute the lowering and elevating portions of the foot end divided into two parts widthwise, and connected and operating as a whole in the manner set forth.

Improvement in the mode of making and affixing the Ears and Bails of Pails, Buckets, &c. By JOHN F. PHELPS, Havana, New-York. May 12.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the so constructing and affixing the ears and bails of buckets or other vessels of wood, or of metal, as that the hooks of the bails bent inwards shall be received and turn within a cavity, prepared to receive them on the under sides of the ears, as herein described, the latter being attached so as to stand below the rims of the vessels to which they are affixed. I do not claim the mere turning of the hooks inwards, this having been before done, but I claim only the combination of the hooks and ears as above set forth.

Improvement in the construction of Dry Docks. By JOHN S. GILBERT, New-York, May 12.

CLAIM.—What I claim therein as of my own invention, and desire to secure by letters patent, is, 1. The particular manner of arranging the cross timbers by placing a part below and a part above the caulked bottom, thereby securing said *caulked bottom between clamps*, for the purpose of preventing the opening and shutting of said caulked seams, &c. 2. The employment of a hydrostatic water stopper, for the purposes and in the manner heretofore described in this specification.

Improvement in the mode of preventing explosions in Steam Boilers. JAMES REID, Pawtucket, R. I. (An alien who has resided in the United States one year next preceding his application.) May 19.

CLAIM.—I claim as my invention, *first*, the coiled or otherwise properly shaped tube or vessel P, Q, R, chamber C, tube B, cylinders A, and float G, in combination with the safety valve, the whole operating together by the surcharged steam acting on and expanding the water or gas in the tube P, Q, R, thereby forcing the column of mercury to rise into the chamber A, and lift the float G, and lever M, N, of the safety valve thereto connected, thus allowing the escape of steam whenever at such times an accumulation of superabundance of heat therein may be dangerous or tend to produce an explosion of the generator.

Improvement in Machines for Cleaning Grain. By SAMUEL SPANGLER, Stony Creek, Pa. May 19th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, consists in the before described fans, arranged one over the other, in a perforated case, so that they shall act both as beaters and fans, as herein set forth, in combination with the fan I, in the enlarged part of the case.

Improvement in the Floating Dry Dock. Patented to James Peck, Robert Wash, William Thomas, and John D. Coulter, on the 26th of March, 1834. By WILLIAM THOMAS, St. Louis, Missouri. May 19th, 1840.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the employment of the *ballast cistern* in combination with the floats, in the manner herein described.

I also claim the making of the *bulk heads*, which separate the chambers, *water-tight*, so as to prevent the water from passing from one chamber to another, except through the pipes governed by cocks, as herein described. I also claim the mode of connecting the several chambers and the wells by means of water and air pipes, governed by cocks, valves, or gates for the purpose, and in the manner described.

Improvement in Pumps. By LEBBEUS CASWELL, Harrison, Cumberland county, Me. May 19th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the constructing of one or more slits in the lower part of the tube or bore of the pump as described, and connecting the piston rod with the moveable piston by passing it through the same, as herein set forth.

Improvement in Rifles and other Fire-Arms. By JAMES R. THOMAS, Collinsworth, Talbot county, Ga. May 19th.

CLAIM.—I do not make claim to either of these parts taken individually; but I do claim the manner in which I have combined them with each other so as to coöperate together, substantially in the manner and for the purpose set forth.

Improvement in Bee-Hives. By ROBERT MARTIN, Fairfield, Columbiana county, Ohio. May 19th.

CLAIM.—What I claim as my own invention, and desire to secure by letters patent, is the mode of removing the dirt from the top to the bottom of the house by means of the apertures in the floors and drawers, combined so as to form a passage from the top to the bottom of the hives; the whole being constructed as set forth in my specification.

Improvement in Threshing-Machines. By DAVID STAFFORD, Syracuse, Onondaga county, N. Y. May 19th.

CLAIM.—What I claim as my invention and improvement, and desire to secure by letters patent, is the manner of constructing the feeding-

table or drop-apron, with one section to drop with the hinge or pivot, and with the springs or other means underneath to sustain the same, as above described, and the object of which is to prevent injury and fracture to the machine in the manner before described. The same principle is applicable to all other machines for a like or similar purpose, and my claim is not confined to machines of the peculiar construction of that above described and specified.

Improvement in the mode of applying Water to propel Machinery. By WILLIAM BAKER, Utica, N. Y. May 19th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the method herein described of applying the atmospheric pressure to propel a revolving engine or machine, by placing a conductor for the passage of the water below such engine or machine, by the descent of the water in which conductor a pressure of atmosphere is brought to bear on the engine or machine, corresponding to the height of the column of water below it. I also claim the combination of the revolving cylinders, and the enclosure in which they are placed, with the conductor below said engine: the whole being constructed, arranged and operating substantially in the manner herein set forth.

Improvement in Pumps. By JOSEPH EVANS, Lebanon, Warren county, Ohio. May 25th.

CLAIM.—What I claim therein as constituting my invention, and design to secure by letters patent, is the manner in which I have combined and connected the copper tube forming the chamber of my pump with the lower box or valve, and seat thereof, as described, and for the purpose set forth. I also claim the manner in which I have constructed the upper box, or valve and seat, as described; that is to say, the causing the leather disk which constitutes the valve, not only to operate as a valve, but also as a packing to the piston, substantially as set forth.

Improvement in the Machine for Washing Clothes. By SEWALL BENSON, Waterville, Kennebec county, Me. May 25th.

CLAIM.—What I claim therein as constituting my improvements, and desire to secure by letters patent, are the following particulars:—1st. The manner in which I have arranged and combined the rollers on semicircular arms, vibrating on their centres upon vibrating arms, and regulated in their action by the lever M borne up by means of a weight, as above set forth.—2d. The combination of the rollers attached to the semicircular arms, with the vibrating frame and fluted wash-board. In making the foregoing claims, I do not intend by the terms employed to limit myself to the precise form and particular construction by me set forth, as these may be departed from without substantially altering the nature and operation of the machine: the semicircular arms, for example, may be replaced by arms not semicircular; the weight for making pressure against the rollers may be substituted by a spring; and other changes of a like nature may be made, and yet the essential characteristics of my machine might still remain, as every competent machinist is well aware.

Improvement in the Seed-Planting Machine. By GEORGE PAGE, Baltimore, Md. May 25th.

CLAIM.—What I claim therein as constituting my invention, and desire to secure by letters patent, is the manner of combining the hopper and the receptacle with the sliding shutter, so as to govern the level of the seed in said receptacle, and thus to regulate the feed in combination with the elevating belt D, in the manner set forth. I claim also the attaching of a separate marking wheel K, in the manner and for the purpose above expressed.

Improvement in the construction of Metallic Sleigh-Runners. By ARUNAH SPEAR, Braintree, Orange county, Vt. May 25th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the construction of the runners of a sleigh, of iron or other metal, in the manner above set forth, so as to cause the strain arising from a pressure on one side of the runner, and a pulling on the other in a manner tending to break the same, to act mainly on the edge of a thin piece of iron or other metal, thereby avoiding an inconvenient weight and preventing the centre from operating as a fulcrum over which to break the sides of the runner, nave, or panel.

Improvement in the Life-Preserver or Buoyant Dress. By RUFUS PORTER, Billerica, Middlesex county, Mass. May 25th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is making the buoyant circle in several separate, air-tight chambers, each provided with a tube for inflating, as described. I also claim the circular fins or paddles in combination with the water-proof garment, as described.

Improvement in the Clasps of Carpet-Bags. By JAMES SELLERS and A. L. PENNOCK, Philadelphia. May 25th.

CLAIM.—What we claim as our invention, and desire to secure by letters patent, is the construction of a clasp composed entirely of wood, and the adapting the same to and combining it with bags for the conveyance of letters, traveling bags, or valises, and such others to which it may be adapted; the said clasps being connected together by hinges of metal, by links, or by any flexible material which may be preferred.

Improvement in the construction of Cooking Stoves. By WM. JEANES, Philadelphia. May 25th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the particular manner in which I have constructed, arranged and governed, the passages for the draught from the fire, as above described: that is to say, the manner in which I have divided the box or body containing the oven into two chambers or compartments, by means of the partition G G, cutting off all communication between said compartments excepting through the opening F, or through the columns D D, said box being connected with the base by their means; the whole structure being combined, arranged, and operating substantially in the manner and for the purpose herein set forth.

LIST OF ENGLISH PATENTS

Granted between the 28th February and the 27th March, 1840.

James Beaumont Neilson, of Glasgow, gentleman, for certain improved methods of coating iron under various circumstances, to prevent oxidation or corrosion, and for other purposes. Patent dated Feb. 29; six months to specify.

Rowland Macdonald Stephenson, of Upper Thames street, civil engineer, for an improved method, or methods of adjusting, shifting, and working theatrical scenery and apparatus. Feb. 29; six months.

Richard Edwards of Fairfield place, Bow, dealer in emery cloth, for improvements in preparing and combining of materials used in lighting or kindling fires. Feb. 29; six months.

John Sylvester, of Great Russell street, engineer, for improvements in the construction of doors and frames, for closing the openings of fire places, ash pits, flues, chimneys, and certain retorts. March 3; six months.

Joseph Shore, of Birmingham, merchant for improvement in preserving and covering certain metals and alloys of metals. March 3; six months.

James Horne, Clapman Common, Esq. for improvements in the stuffing boxes of lift pumps. March 3; six months.

Joseph Clisild Daniell, of Limpley Stoke, Wilts, for an improved method of preparing shoot or weft to be used in weaving woolen cloth, and cloths made of wool and other materials. March 3; six months.

John Rangeley, of Camberwell, gent. for improvements in the construction of railways, and in the means of applying power to propelling carriages and machinery. March 3; six months.

William Craig, of Glasgow, engineer, and William Douglass Sharp, of Stanley, Perthshire, engineer, for certain improvements in machinery for preparing, spinning, and doubling cotton, flax, wool, and other fibrous substances. March 3; six months.

Joseph Norton, of High Bridge Mill, York, manufacturer of fancy cloths, and George Collier, of the same place, mechanic, for an improvement in looms for the weaving of figured and twilled fabrics. March 4; six months.

Joseph Bower, of Hunslet, Leeds, soda ash manufacturer, for certain improvements in the manufacture of carbonate of soda. March 4; six months.

Charles Alexander Petterin, of Leicester square, gent. for improve-

ments in wind and stringed musical instruments. (A communication from a foreigner.) March 4; six months.

Charles Kober, of Leadenhall street, manafacturer, for improvements in fixing color in cloth. March 7; six months.

Caroline Julia Sophia Cox, of Addison Road, Kensington, spinster, for an improved mode of fastening and uniting the edges of the divided parts of shoes, boots, bandages, packages, and other articles of dress and utility. March 7; two months.

Joseph Atkinson, of Round Mill, York, farmer, for improvements in thrashing and winnowing machines. March 7; six months.

Robert Molyneux, of Southampton Row, chronometer maker, for an improvement, or improvements in chronometers. March 7; six months.

William Maltby, Jr. of Mile End, chemist, and Richard Cuerton, Jr. of Percy street, brass founder, for improvements in extracting and concentrating the color, tanin, and other matter contained in vegetable and animal substances. March 7; six months.

Luke Hebert, of Birmingham, C. E., for improvements in the manufacture of cofered spades and shovels, soughing and grafting tools, and other implements of a like nature. March 7; six months.

Hayward Tyler, of Milton street, Cripplegate, engineer, for certain improvements in machinery, or apparatus for impregnating liquids with gas, including bottles for retaining, keeping, and preserving liquids so impregnated; also in the manner of filling and closing such bottles. March 7; six months.

James Knowles, of Little Bolton, Lancaster, coal merchant, for an improved arrangement of apparatus for regulating the supply of water to steam boilers. March 10; four months.

George Gwynne, of Portland Terrace, Regent's Park, gent. for improvements in the manufacture of candles, and in operating upon oils and fats. March 10; six months.

Wm. Forrester, of Barrhead, Renfrew, manager, for certain improvements in sizing, starching, dressing, and otherwise preparing warps, for weaving fabrics, and on the machinery and apparatus therewith connected. March 11; six months.

Thomas Peet, of Bread street, Cheapside, gent. for certain improvements in steam engines. (A communication from a foreigner.) March 11; six months.

Richard Smith and Richard Hacking, both of Bury, Lancaster, machine makers, for certain improvements in machinery, or apparatus for drawing, slubbing, roving and spinning cotton, wool, flax, silk, and other fibrous substances. March 13; six months.

Etienne Robert Gaubert, of Paris, professor of mathematics, for certain improvements in machinery or apparatus for distributing types or other typographical characters into proper receptacles, and placing

the same in order for setting up after being used in printing. March 13; six months.

James Hadden Young, of Little France, merchant, and Adrien Delcombe, of the same place, manufacturer, for an improved mode of setting up printing types. March 13; six months.

Robert Haricas, of Burton Crescent, surgeon, for improvements in rendering fabrics and leather waterproof. March 16; six months.

William Crofts, of Radford, Nottingham, machine maker, for improvements in machinery for the purpose of making figured or ornamental bobbin net, or twist lace, and other ornamented fabrics, looped or woven. March 16; six months.

Jean Francois Victor Fabien, of King William street, city, for improvements in rotary engines to be worked by steam or other fluids. March 16; six months.

Thomas Craddock, of Broaheath, Radnor, farmer, for a certain improvement or improvements in steam engines and steam boilers. March 16; six months.

Richard Smith and Richard Hacking, of Bury, Lancaster, machine makers, for certain improvements in machinery for spinning cotton and other fibrous substances. March 16; six months.

Isham Baggs, of Cheltenham, gentleman, for improvements in engraving, which improvements are applicable to lithography. March 17; six months.

Moses Poole, of Lincoln's Inn, gentleman, for improvements in producing and preparing lays for soap making, and in the manufacture of soap. (A communication from a foreigner.) March 17; six months.

Samuel Seaward, of the Canal Iron Works, Poplar, engineer, for certain improvements in the construction of steam engines, and in the application of steam engines to propelling ships and other vessels. March 17; six months.

Sir William Burnet, of Somerset House, Middlesex, knight, for improvements in preserving animal, woolen, and other fibrous substances from decay. March 19; six months.

John Jackson of Manchester, nail and bolt manufacturer, for certain improvements in the manufacture of nails, nuts, bolts, and rivets. March 19; six months.

Thomas Stirling, of Limehouse, patentee of the Rapid Filterer, for improvements in the manufacture of fuel. March 20; six months.

Francis William Gerish, of East road, City road, patent hinge maker, for improvements in locks and keys, and in other fastenings for doors, drawers, and other such purposes. March 20; six months.

Charles Keene, of Sussex place, Regent's park, gentleman, for improvements in producing surfaces on leather and fabrics. (A communication from a foreigner.) March 23; six months.

William Newton, of Chancery lane, civil engineer, for certain improvements in the strengthening and preserving of ligneous and textile substances. (A communication from a foreigner.) March 23; six months.

Samuel Hill, of Sloane street, Chelsea, gent. for improvement in the making of bread and biscuit. March 25; six months.

Elhanan Bicknell, of Newington Butts, merchant, for improvements in separating the solid from the liquid parts of tallow, and other fatty matters. (A communication from a foreigner.) March 25; six months.

William Palmer, of Sutton street, Clerkenwell, candle maker, for improvements in the manufacture of candles, and in apparatus for applying light. March 25; six months.

Henry Smith, of Birmingham, lamp manufacturer, for improvements in gas burners, and in lamps. March 25; six months.

George Richards Elkington, and Henry Elkington, of Birmingham, for improvements in coating, covering, or plating certain metals. March 25; six months.

Joseph Crossfield, of Warrington, soap maker, for certain improvements in the manufacture of plate glass. March 25; six months.

Samuel Knight, of Woodhouse, Lancaster, bleacher, for certain improvements in machinery or apparatus for boiling, bucking, or scouring, for the purpose of preparing and assisting the process of bleaching and dying cotton, and linen, and other fabrics and fibrous substances. March 25; six months.

James Hay, of Belton, Scotland, captain in the Royal Navy, for an improved plough, which he titles the "Belton Plough." March 25; six months.

Henry Philip Rouguette, of Norfolk street, Strand, merchant, for a new pigment. (A communication from a foreigner.) March 25; four months.

James Sabberton, of Great Pulteney street, Golden square, tailor, for a fastening to attach straps to the bottoms of trowsers. March 26; two months.

Alexander Southwood Stocker, of Birmingham, manufacturer, for certain improvements in manufacturing tubing, or tubes, which are applicable to gas and other purposes. March 27; six months.

Richard Prosser, of Cherry street, Birmingham, C. E., for certain improvements in machinery, or apparatus for manufacturing pipes. March 27; six months.

Henry Kirk, of Upper Norton street, Portland place, merchant, for improvements in the applications of a substance or composition, as a substitute for ice for skating and sliding purposes; part of which imimprovements may also be employed in the manufacture of ornamental slabs and mouldings. March 28; six months.